

# Fighting With Fires: The Future Of Marine Corps Artillery

CSC 1998

Subject Area - Aviation

## EXECUTIVE SUMMARY

**Title:** FIGHTING WITH FIRES: THE FUTURE OF MARINE CORPS ARTILLERY

**Author:** Major John E. Shook, USMC

**Thesis:** Should the Marine Corps consider a rocket system to provide the capabilities to shore up current fire support needs and meet the requirements evolving from Sea Dragon for future warfare?

**Discussion:** During the late 1980's and early 1990's, end strength reductions required a revised force structure. But the new organizational structure resulted in an imbalance in artillery support capability that was further challenged by the cancellation of the planned acquisition of a battalion of multiple launch rocket system (MLRS). Indirect fire support levels are now below that originally planned for the much smaller 159,100 Marine sized force.

Marine Corps fire support should be based on a balanced force of air, sea, and ground systems. The current reactionary structuring process, using weak doctrine and shallow studies, fails to provide a unified and balanced approach to support procurement decisions. The current threat is both internal and external and its vagueness requires a capabilities approach to force development that ensures the flexibility to operate across the full spectrum of conflict. The division commander currently does not have the organic capability to rapidly weight the battle with all-weather, heavy fires.

The current MOA with the Army is not an acceptable long term fire support solution; but it can provide the Marine Corps the time necessary to implement the results of the QDR and design a balanced fire support structure that will blend with the future vision of warfare. Rockets provide an overwhelming increase in firepower with reduced manpower requirements in a cost efficient, rapidly deployable framework, and rocket technology can provide the bridge from current requirements to the futuristic battlefield.

**Conclusions and Recommendations:** Rockets and missiles are undoubtedly the future of fire support and should be an organic asset of the division. Additional support for the MEF should first come from Marine reserve units equipped with rockets also. To buy time for the combat development process, the Marine Corps must renew and strengthen the MOA with the Army. The agreement must cover a minimum of five years and solve the various weak points. To encourage Army support, the Marine Corps should join in the joint development of HIMARS. The Marine Corps must address its lack of doctrine for structuring fire support. Accepting Army doctrine will save time and resources and enhance joint interoperability in the future. However, that doctrine must be applicable with the Marine Corps force structure and unique missions. The

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>1998</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-1998 to 00-00-1998</b>	
4. TITLE AND SUBTITLE <b>Fighting With Fires: The Future Of Marine Corps Artillery</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>United States Marine Corps, Command Staff College, Marine Corps University, 2076 South Street, Marine Corps Combat Development Command, Quantico, VA, 22134-5068</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>89</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

issue of a MEF level artillery headquarters and fires capability should also be resolved as part of the doctrinal discussions. Most importantly, the Marine Corps must immediately finalize the draft Mission Need Statement for an Expeditionary Indirect General Support Weapons System (EIGSWS) that emphasizes a capabilities approach for general support fires. Once the QDR and NDP findings are released and approved by Congress the Marine Corps must craft a balanced fire support organization that will continue to protect America's freedom.

## CONTENTS

EXECUTIVE SUMMARY .....	iii
CONTENTS .....	v
LIST OF FIGURES.....	viii

CHAPTER	PAGE
1. DRAWING DOWN .....	1
2. CURRENT ARTILLERY STRUCTURE .....	3
Tempo Versus Continuous Support, 4	
General Support Artillery, 5	
3. MINIMUM ADEQUATE ARTILLERY SUPPORT .....	7
World War II: Division and Force Level Artillery, 8	
Forty Years of Conflicts, 11	
Korea, 11	
Vietnam, 12	
Desert Storm, 13	
Future Conflicts, 15	
Marine Doctrine, 15	
Army Doctrine, 17	
Structure Versus Doctrine Void, 22	
Memorandum of Agreement, 24	
Permanence, 25	
Availability, 26	
Command Relationship, 27	

4. THE THREAT .....	29
Enemy Threat, 29	
Domestic Threat, 30	
Money, 30	
Roles and Mission = Structure, 30	
Duplication, Redundancy, or Necessary Capability, 32	
Technology, 35	
Time, 36	
5. MARINE CORPS FIRE SUPPORT CHALLENGES .....	37
Maneuver Support, 37	
Force Fires, 38	
Combined and Coalition Warfare, 39	
Maritime Prepositioned Force, 39	
Balancing Fire Support: Air, Sea, Ground Based, 40	
Aviation, 41	
Naval Surface Fire Support, 43	
Ground Based Systems, 43	
Combined Arms, 47	
Future Concepts, 47	
Fire Support Studies, 49	
Weaknesses, 50	
Findings, 51	
Conclusions, 52	

6. ROCKET/MISSILE POTENTIAL .....	53
Capabilities, 54	
Limitations, 54	
Cost, 56	
Technology, 58	
Range, 58	
Ammunition, 58	
Precision, 59	
Versatility, 59	
Mobility, 59	
7. POTENTIAL SOLUTION .....	61
8. SUMMARY .....	63
9. CONCLUSIONS AND RECOMMENDATIONS .....	64
<b>Appendixes</b>	
A. ARTILLERY TACTICAL MISSION INHERENT RESPONSIBILITIES .....	67
B. THE MEMORANDUM OF AGREEMENT ... ..	68
<b>Bibliography .....</b>	<b>70</b>

## LIST OF FIGURES

Figure	Page
1. Howitzer Tubes Available in the Active/Reserve Force Structure .....	2
2. WWII Marine Corps Artillery Structure (Okinawa) .....	9
3. Marine Artillery Structure in Desert Storm .....	14
4. Army Organic Divisional Artillery for Heavy Division .....	17
5. Army Separate Artillery Brigade .....	18
6. Army Artillery Allocation for Heavy Division .....	18
7. XVIII Airborne Corps Organic Artillery Support .....	20
8. Cost Comparison (in FY 97 Dollars) .....	56
9. NOTIONAL Marine Division Active Duty Fire Support Structure .....	61

## **FIGHTING WITH FIRES: THE FUTURE OF MARINE CORPS ARTILLERY**

The tendency towards under-rating firepower...has marked every peace interval in modern military history.

B. H. Liddell Hart: Thoughts on War, 1944

### **CHAPTER 1**

#### **DRAWING DOWN**

During the late 1980's and early 1990's, the Marine Corps began the difficult task of redesigning force structure in response to the collapse of the Soviet Union and the resulting change in focus for United States defensive policy. The replacement of aging fire support systems with equipment purchased during the Reagan/Bush years required new approaches to the organization of artillery support units. Plans to downsize the Corps by about twenty percent, from 197,000 to approximately 159,100, reduced the Corps' ability to successfully execute its wide ranging missions. Eventually the Department of Defense settled on an authorized end strength of 174,000 Marines. This represented an actual reduction of approximately 10 percent of the active forces of the Corps. In comparison, the cut of 152 of the artillery tubes available for support for the active forces, with an additional 18 more tubes cut from the reserve structure, amounted to approximately a forty-five percent reduction of the artillery force and leaves only 180 active and 90 reserve artillery tubes remaining as shown in Figure 1.<sup>1</sup> While initial plans called for the reduction of up to eight infantry battalions from the active force of twenty-seven

---

<sup>1</sup>L. D. Walters, Col, USMC, Acting Head, Expeditionary Policies Branch, Position Paper, subject: "General Support Artillery Capability," 24 June 1996.



battalions, the finalized structure retained twenty-four battalions.<sup>2</sup> The resulting imbalance in artillery support for maneuver units was further challenged by the cancellation of the planned acquisition of a battalion of multiple launch rocket system (MLRS). The end result places indirect fire support levels well below that originally planned for the much smaller 159,100 Marine sized force.<sup>3</sup> This paper examines the effects this reduced structure has on fire support for the Marine Division and the Marine Expeditionary Force (MEF) in its warfighting role. Additionally, the changing nature of future war's fire support requirements will be analyzed to determine if the Marine Corps should invest in a rocket system at this time to balance today's deficiencies with tomorrow's emerging demands for combat effectiveness and cost efficiency.

<b>Regiment</b>	<b>FY88</b>	<b>FY89</b>	<b>FY90</b>	<b>FY91</b>	<b>FY92</b>	<b>FY93</b>	<b>FY94</b>
<b>10th Mar</b>	120	96	96	96	72	72	72
<b>11th Mar</b>	92	86	86	86	72	72	72
<b>12th Mar</b>	120	114	102	102	54	54	36
<b>Total</b>	332	296	284	284	198	198	180
<b>14th Mar</b>	108	108	108	108	108	108	90

**Figure 1. Howitzer Tubes Available in the Active/Reserve Force Structure**

<sup>2</sup>John Narney and others, PRC, Inc., Final Report to Marine Corps Combat Development Command, *Mission Area Analysis (MAA) of Mission Area [MA] 24 - Fire Support (1993-2003)* (Quantico, VA: July 1993) , 1-13.

<sup>3</sup>CMC Force Structure Planning Group, Briefing Slides, *USMC 2001: A Concept for the Employment of Marine Corps Total Force in Joint Operations into the 21st Century* (Quantico, VA: 1993) , 32.

## **CHAPTER 2**

### **CURRENT ARTILLERY STRUCTURE**

By 1994 Marine artillery had reconfigured to the current structure of ten active duty battalions and five reserve battalions. Each of the active duty battalions are mirror-imaged as direct support battalions and all are equipped with the M198, 155mm towed howitzer. The artillery battalion structure consists of 47 officers and 576 enlisted Marines organized into a Headquarters battery and 3 firing batteries. Each battalion contains a full complement of forward observer (FO) and liaison (LN) teams to integrate fires for the maneuver element they may be assigned to support. This new structure provides FO and LN support for up to four maneuver elements and remedies many problems encountered as the Marine Corps embraced maneuver warfare.

The addition of three light armored infantry battalions (LAI), now called light armored reconnaissance (LAR), and the more aggressive use of the organic tank battalion as a maneuver element, or as the base unit for task organized forces, severely strained the artillery regiment's ability to provide timely, well-coordinated, direct support fires for a more mobile and maneuverable force with even more maneuver units. Mirror imaging each artillery battalion provided the capability for a fourth direct support battalion, but the creation of this additional capability masked the costs associated with its development. The Marine Air-Ground Task Force (MAGTF) study of 1989 recommended a 4x6 artillery battalion structure.<sup>4</sup> This indicates four firing batteries consisting of six guns each that would provide 24 howitzers per battalion for support. However, due to the limited force structure available, a battery was taken from each of the existing battalions to create the additional direct support battalion--resulting in a 3x6

structure for each of the 10 active artillery battalions. This organization has created two critical challenges: providing artillery support for mechanized forces and providing reinforcing and general support fires.

### **Tempo Versus Continuous Support**

As the Marine Corps becomes more mechanized, fire support elements face a more difficult challenge to support rapidly moving maneuver forces. In order to provide responsive covering fires, an artillery battalion leapfrogs firing batteries from position to position to maintain range fans capable of ensuring fires are available when and where they may be needed for the advancing maneuver formation. Normally, in today's faster paced operations, self-propelled artillery provides this capability. However, since mechanized artillery is more difficult to deploy due to its size and weight, and is more costly, the Marine Corps has decided to use only towed artillery.

Although this simplifies logistics for the inventory and maintenance of parts, it places a greater challenge on the artillery battalion to guarantee continuous coverage. Better intelligence about the enemy and more detailed integration of artillery displacements with the supported unit's scheme of maneuver can partially compensate for the challenges of increased tempo; but the most significant factor affecting tempo was the reassignment of the fourth firing battery from each of the three direct support (DS) battalions to create a fourth 3x6 DS battalion.

The restructuring plan developed at the 1989 Artillery Conference called for 4x6 battalions that would provide the additional maneuverable battery to maintain the battalion's firepower with 24 howitzers as in the old 3x8 organization and have the flexibility to support

---

<sup>4</sup>W. N. Brown, Jr., Maj, USMC, *The Reorganization of Marine Artillery*, Monograph, Marine Corps Command and Staff College (Quantico, VA: 1992) , 7.

mechanized units.<sup>5</sup> This point was reinforced in the lessons from Desert Storm that validated the capability of towed artillery battalions, 4x6, to support highly maneuverable forces in a theater characterized by poor roads and soft, sandy soil that hampered cross-country movement by vehicles.<sup>6</sup> Colonel R. A. Gangle provided a dissenting opinion in a Desert Shield/Storm after action report from Regimental Landing Team 5 (RLT)--there is still considerable debate about the suitability of towed artillery to support mechanized forces.<sup>7</sup>

### **General Support Artillery**

By far the most critical aspect of the changes in force structure, is the significant reduction of reinforcing and general support artillery capability. The practice of referring to types of artillery pieces or units as general support (GS), general support reinforcing (GS-R), reinforcing (R), or direct support (DS) artillery is a misnomer. Used correctly, these refer to the four standard tactical missions and their associated inherent responsibilities (see Appendix A) that may be assigned to artillery battalion and higher level units. However, this error is widely practiced due to the association of system and structure characteristics that make a howitzer or organization more suited to one type of mission over another. Units equipped with light artillery pieces with high rates of fire are better suited for DS; but the capabilities desired for GS missions are heavy caliber weapons with longer ranges. Artillery units that are not structured with organic FO and LN teams are usually assigned GS, GS-R, or R missions and not DS missions. While each of the Marine Corps' artillery battalions can be assigned and execute any

---

<sup>5</sup>Brown, 7.

<sup>6</sup>L. M. Palm, Col, USMC, 10th Marine Regiment, Report Number 32369-40692, Marine Corps Lessons Learned System, subject: "Summary - 10th Marines Operations" (Southwest Asia: 23 March 1991) .

one of the four standard tactical fire support missions, allocating the battalions that habitually provide DS to other missions could leave a committed maneuver unit without responsive artillery support. At times, in the complexity of battle, this may be necessary to weight the main attack; but this should not become the norm or doctrinal approach as a result of a force structure that severely limits the availability of artillery.

In addition to weighting the main attack, artillery should be available for the higher commander as established in *FMFM 2-7, Fire Support in Marine Air-Ground Task Force Operations*, “The force or division commander must retain immediately available artillery with which he can influence the action. GS and GS-R missions facilitate this fundamental.”<sup>8</sup> Global sourcing has become the accepted procedure for commanders concerned about the lack of artillery to acquire the units necessary to weight the main effort and provide GS fires for the overall force or for the commander to shape the battlefield for future operations.

The concept of global sourcing attempts to fulfill requirements for forces by shifting organic structure from an uncommitted organization to provide needed capabilities. This is acceptable in very limited operations and can apply in larger conflicts that allow for the mobilization of the reserves. While this task organization approach may meet the critical needs of the supported force, the organizations providing the units become less combat ready. Essentially, global sourcing has the potential to recreate the “hollow” force of the 70’s by accepting improperly balanced forces while deferring difficult structural decisions. The process

---

<sup>7</sup>R. A Gangle, Col, USMC, RLT-5, Report Number 41343-32962, Marine Corps Lessons Learned System, subject: “Ability of Towed Artillery to Provide Fire Support for the Infantry” (Southwest Asia: 4 August 1990) .

<sup>8</sup>Fleet Marine Force Manual (FMFM) 2-7, *Fire Support in Marine Air-Ground Task Force Operations* (Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps, 28 September 1991) , 2-5.

to determine artillery structure begins with an analysis of the concept of minimum adequate artillery support.

## CHAPTER 3

### MINIMUM ADEQUATE ARTILLERY SUPPORT

Organizing artillery for combat is one of the first steps in planning fire support. This process is a combination of allocating artillery forces to subordinate organizations and the assignment of tactical missions to artillery units retained at a given force level. The resulting plan should fulfill the artillery mission established in FMFM 6-9, *Marine Artillery Support*:

Furnish close and continuous fire support by neutralizing, destroying, or suppressing targets which threaten the success of the supported unit. To accomplish its mission, artillery conducts three tasks:

Provides timely, close, accurate, and continuous fire support.

Provides depth to combat by attacking hostile reserves, restricting movement, providing long-range support for reconnaissance forces, and disrupting enemy command and control systems and logistical installations.

Delivers counterfire within the range of the weapons systems to ensure the freedom of action of the ground forces.<sup>9</sup>

Since the battalion is the smallest artillery unit assigned a tactical mission, it has generally become accepted that an artillery battalion will be assigned the mission for direct support of a maneuver regiment. This is now specifically spelled out as doctrine in FMFM 6-9 as, “The minimum adequate fire support for a committed unit (e.g., infantry regiment or separate maneuver battalion) is normally considered to be one artillery battalion in DS. Some situations may require more artillery support; e.g., reinforcing or GS-R artillery. This may result in less support or no DS to one unit to increase the combat power of another.”<sup>10</sup> To make such a critical decision, the commander must also rely on an analysis of the mission, enemy, terrain and weather, troops and support available, and time available (METT-T) to determine adequate

---

<sup>9</sup>Fleet Marine Force Manual (FMFM) 6-9, *Marine Artillery Support* (Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps, 29 June 1993) , 1-3, 1-4.

artillery support in a given situation. A brief historical review of various applications of this principle of artillery support may help clarify this point and establish a baseline for further analysis.

### **World War II: Division and Force Level Artillery**

During the battle for Okinawa, in April 1945, III Marine Amphibious Corps (MAC) landed two divisions; each supported by an organic artillery regiment consisting of two 75 mm towed howitzer battalions and two 105 mm towed howitzer battalions.<sup>11</sup> Figure 2 depicts the divisional artillery and III MAC's corps level artillery organized into two groups of three battalions each.<sup>12</sup> These groups gave the III MAC Commander, Major General Roy S. Geiger, the capability to rapidly weight the main effort, fight the deep battle, or shape the battlefield for future operations without stripping away the organic artillery of the division commanders. Thus, the divisions retained adequate artillery to provide direct support and reinforcing fires for the close battle.

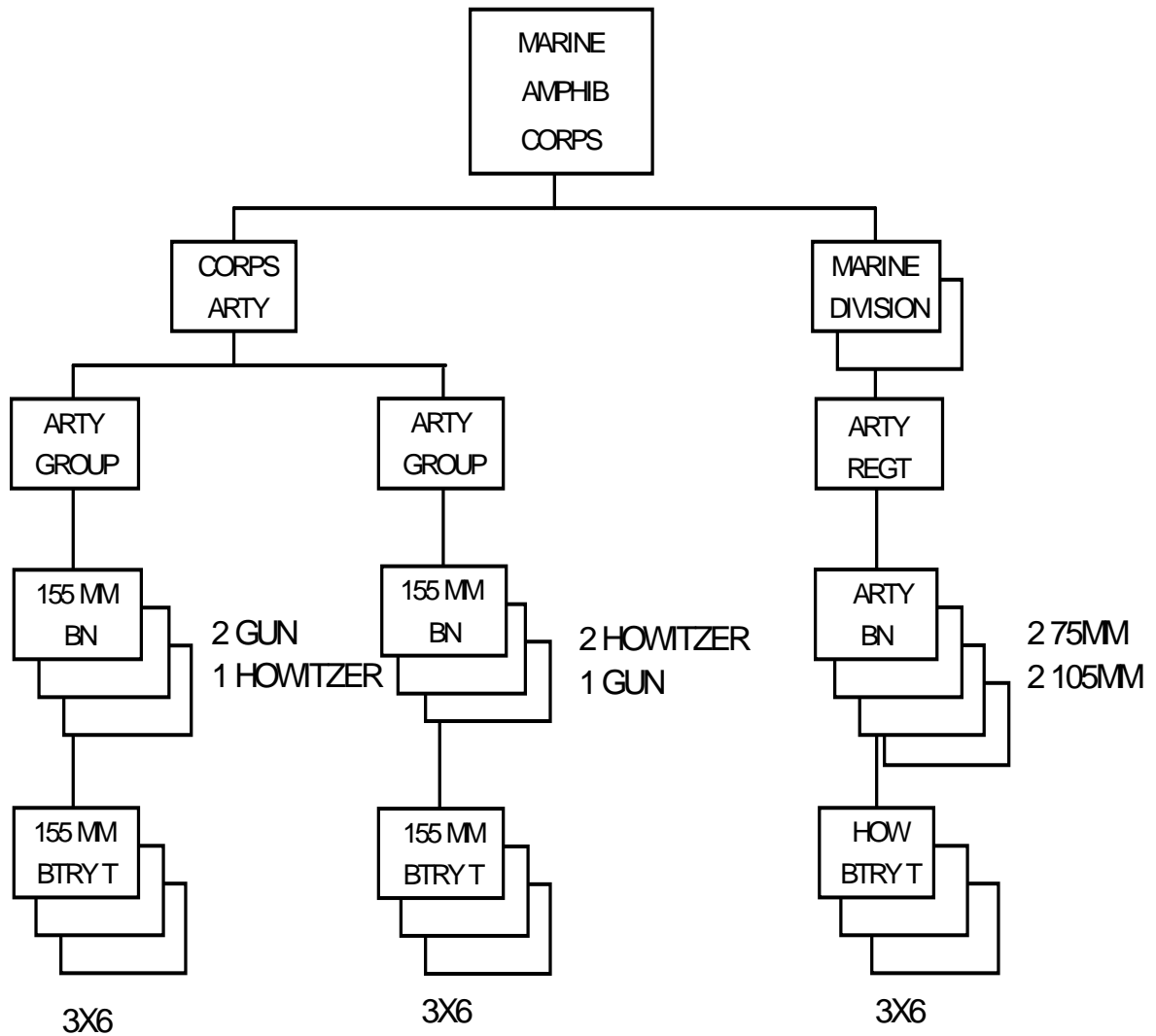
---

<sup>10</sup>FMFM 6-9, 2-8.

<sup>11</sup>Jeter A. Isely and Philip A. Crowl, *The U. S. Marines and Amphibious War* (Princeton, NJ: Princeton University Press, 1951) , 340.

<sup>12</sup>Chas. S. Nichols, Jr., Maj, USMC, and Henry I. Shaw, Jr., *Okinawa: Victory in the Pacific*, Historical Branch G-3 Division, Headquarters, U. S. Marine Corps (Washington, DC: GPO, 1955) , 26, 291.





**Figure 2. WWII Marine Corps Artillery Structure (Okinawa)**

As the battlefield conditions changed (METT-T), Marine corps level artillery was transferred to the Army forces fighting in the southern part of the island to provide additional combat power to the battle there. Still later, the divisional artillery of the 1st Marine Division, the 11th Marines, was also reassigned to support the beleaguered Army units facing the formidable Shuri Line in the south. After additional requests for the piecemeal reassignment of III MAC's units to

the southern front, General Geiger argued against breaking up an effective team. In response to his concerns, the 1st Marine Division was moved to the south and reformed with all of its elements. After the northern part of the island was secured, the entire III MAC was relocated to the line of battle in the south.<sup>13</sup>

Throughout the Campaign for Okinawa massive fire support was also available from over 200 fire support ships, some 41 aircraft carriers, and land based planes that included an Army Air Corps fighter wing and three Marine air groups. Despite the availability of this remarkable firepower, there was an obvious need for both divisional and corps level artillery. In all over 27 battalions of artillery supported the four committed divisions.<sup>14</sup> Each infantry regiment generally had a battalion of DS artillery and could call for reinforcing and general support fires as needed. Artillery battalion missions were changed as necessary to support the scheme of maneuver and METT-T. The 6th Marine Division had 22 battalions of artillery supporting its attack on the town of Makabe.<sup>15</sup> This campaign provides a prime example of the complementary nature of various means of fire support: air, sea, ground. It also shows the value of a flexible artillery organization that meets the needs of the commander at every level. While the fog of war may dictate a non-standard approach, such as the shifting of organic divisional artillery to another force, this is not the optimum or preferred approach over the long run.

### **Forty Years of Conflicts**

---

<sup>13</sup>Colby B. Smith, Maj, USMC, *Case Study: Selected Joint Aspects of the Battle of Okinawa 1945*, Monograph, Marine Corps Command and Staff College (Quantico, VA: 1994) , 4-7.

<sup>14</sup>Roy E. Appleman and others, *The War in the Pacific Okinawa: The Last Battle* (Washington, DC: GPO, 1948) , 194.

After World War II the general organizational framework of Marine artillery continued to be based on separate divisional and force artillery structures. Despite the organizational structure, the force artillery was usually parceled out as attachments to the divisions' artillery regiment until 1978 when the Field Artillery Groups (FAG) that provided the general fire support for the Marine Amphibious Force (MAF) were disbanded.<sup>16</sup> This reorganization placed all artillery units under the artillery regiment organic to the division.

**Korea.** By 1950 the entire Fleet Marine Force totaled only 23, 952 Marines as a result of the massive downsizing of the Armed Forces after WWII: with only six infantry battalions remaining in the active forces. The 1st Provisional Marine Brigade was formed with 6,534 Marines for the initial Marine deployment to Korea.<sup>17</sup> Forming-up and mounting-out this force severely taxed every unit in the Marine Corps—some almost to the point of non-existence.

This Marine Air-Ground Task Force (MAGTF) fought in defense of the Pusan Perimeter for 67 days until disbanded and returned to the control of the division and wing for the Inchon landing. As the only Marine division committed to action in Korea, the 1st Marine Division fought as part of various Army corps. Therefore, the Marines did not establish a MAC (MEF) higher headquarters, as at Okinawa, so forces were allocated to the division as the senior Marine warfighting headquarters. But this lack of a higher Marine headquarters to integrate air and ground forces and defend MAGTF organization eventually led to the assignment of the 1st

---

<sup>15</sup>Isely, 564.

<sup>16</sup>David N. Buckner, Maj, USMC, *A Brief History of the 10th Marines*, History and Museums Division, Headquarters, U. S. Marine Corps (Washington, DC: GPO, 1981) , 112.

<sup>17</sup>Robert Debs Heinl, Jr., Col, USMC (Ret.), *Victory At High Tide: The Inchon-Seoul Campaign* (Annapolis, MD: The Nautical & Aviation Publishing Company of America, 1979) , 7, 18.

Marine Air Wing under Air Force control.<sup>18</sup> This began a trend to refocus the role of the MEF from warfighter to force provider that continued through the next two wars as well. The dismal personnel readiness of the remaining Marine Corps forces precluded the employment of Force Troop's field artillery groups. The four organic artillery battalions of the 11th Marines were occasionally augmented by fires from Army Corps artillery battalions and, for one operation, an Army artillery battalion was attached to the 11th Marines.<sup>19</sup>

**Vietnam.** Although the Marine Corps' force structure during Vietnam provided force artillery, those assets were usually allocated to the divisions for control by the artillery regiments. The widely dispersed infantry units required a decentralized structural approach and direct support artillery units were often attached to infantry regiments or even battalions. The artillery regiments were task organized differently based on the mission and assets available, but contained significant firepower that included 4.2 inch mortars; 105mm, 155mm towed howitzers; 155mm self propelled howitzers, 175mm self propelled guns, and 8 inch self propelled howitzers.<sup>20</sup> By 1970, the 11th Marines commanded 156 various *tubes* of artillery. This mix of weapons provided a diverse set of capabilities that included, "long-range, heavy artillery support throughout the division TAOR [tactical area of responsibility]."<sup>21</sup>

---

<sup>18</sup>J. Robert Moskin, *The Story of the U.S. Marine Corps* (New York: Paddington Press LTD, 1979) , 447, 461, 543, 585.

<sup>19</sup>Heinl, 56, 150, 237, 265.

<sup>20</sup>Gary L Telfer, Maj, USMC, Lane Rogers, LtCol, USMC, and V. Keith Fleming, Jr. *U.S. Marines in Vietnam: Fighting the North Vietnamese, 1967*, History and Museums Division, Headquarters, U.S. Marine Corps (Washington, DC: GPO, 1984) , 212, 213, 217.

<sup>21</sup>Graham A. Cosmas and Terrence P. Murray, LtCol, USMC, *U.S. Marines in Vietnam: Vietnamization and Redeployment 1970-1971*, eds. William R. Melton, Maj, USMC and Jack Shulimson, History and Museums Division, Headquarters, U. S. Marine Corps (Washington, DC: GPO, 1986) , 299.

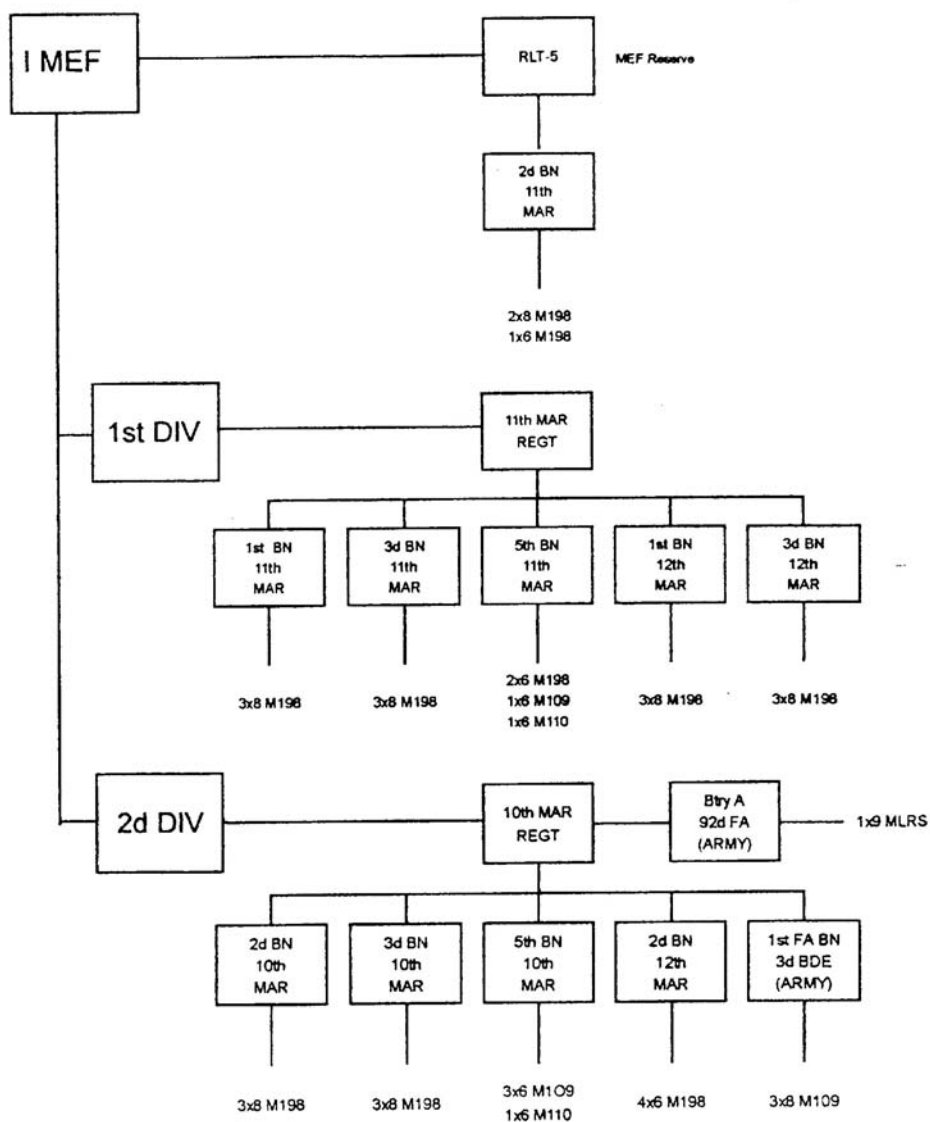
**Desert Storm.** The I Marine Expeditionary Force (MEF) also fought Desert Storm by allocating all additional artillery assets to the divisions. The single exception was a battalion of 22 M198 towed howitzers attached to the 5th MEB. Although the MEB remained afloat in the Persian Gulf during Desert Shield; it landed as the MEF reserve as the ground war commenced.<sup>22</sup> Despite the emerging doctrine and reduced artillery structure, the 11th Marines, 1st Marine Division commanded five artillery battalions that totaled 120 howitzers.<sup>23</sup> The 10th Marines, 2d Marine Division also commanded five battalions (including the attached Army battalion) that totaled 120 howitzers and an Army battery of nine MLRS launchers. The artillery regiments' organizational structure depicted in Figure 3, encompassed a variety of battalion options: 18 or 24 gun battalions with batteries of 6 or 8 guns.<sup>24</sup> In order to fight as a highly mechanized force, the 2d Marine Division's artillery included 48 self-propelled howitzers.

---

<sup>22</sup>Charles J. Quilter, II, Col, USMCR, *U.S. Marines in the Persian Gulf, 1990-1991: With the I Marine Expeditionary Force in Desert Shield and Desert Storm*, History and Museums Division, Headquarters, U.S. Marine Corps (Washington, DC: GPO, 1993) , 90, 91.

<sup>23</sup>Charles H. Cureton, LtCol, USMCR, *U.S. Marines in the Persian Gulf, 1990-1991: With the 1ST Marine Division in Desert Shield and Desert Storm*, History and Museums Division, Headquarters, U.S. Marine Corps (Washington, DC: GPO, 1993) , Appendix B. Although the Appendix lists major weapons systems totaling 80 howitzers, questionnaires sent to the Desert Storm artillery battalion commanders by the author report a total of 120 howitzers in support of the 1st Marine Division at the start of the ground war. The employment of 5th MEB as the MEF reserve added 22 more howitzers. (see Quilter above).

<sup>24</sup>Dennis P. Mroczkowski, LtCol, USMCR, *U.S. Marines in the Persian Gulf, 1990-1991: With the 2D Marine Division in Desert Shield and Desert Storm*, History and Museums Division, Headquarters, U.S. Marine Corps (Washington, DC: GPO, 1993) , 7, 8.



### Note

M198 – 155 mm towed howitzer.

M109 – 155 mm self-propelled howitzer.

M110 – 8 inch self-propelled howitzer.

**Figure 3. Marine Artillery Structure in Desert Storm**

**Future Conflicts.** The reemergence of the MEF as a warfighter, rather than force provider, questions the role and necessary capabilities required by the MEF.<sup>25</sup> This shift in warfighting philosophy, combined with the greatly reduced artillery available as a result of the force drawdown, puts the MEF and division commander in a quandary over the use of the same limited assets. While an analysis of the specifics of METT-T may provide short term solutions, the design of force structure for the full spectrum of combat should be based on a more enduring doctrine for fire support.

### **Marine Doctrine**

Marine Corps doctrinal publications focus on the tactics, techniques, and procedures for providing fire support and do not fully address the development of adequate support. As noted previously, the Marine Corps has only developed an understanding of this concept at the lowest levels of direct support. Historical precedent, gut feel, and reaction to change has been the predominant guide for artillery force structure development. This key requirement for designing a capable and balanced force structure was noted as a deficiency in the 1993 Mission Area Analysis (MAA) for Fire Support, “There is a lack of doctrine that identifies how many howitzers and aircraft are needed to support various size MAGTFs [Marine Air Ground Task Force].”<sup>26</sup> This statement, while highlighting the problem, leaves out the vital role of naval gunfire in balancing the fire support equation. By 1995, the next MAA study flatly stated the number one fire support deficiency as, “Marine Corps ground fire support assets do not

---

<sup>25</sup>Charles D. Melson, Maj, USMC (Ret.), Evelyn A. Englander, and David A. Dawson, Capt, USMC, *U.S. Marines in the Persian Gulf, 1990-1991: Anthology and Annotated Bibliography*, History and Museums Division, Headquarters, U.S. Marine Corps (Washington, DC: GPO, 1992) , 224.

<sup>26</sup>Narney, 5-14.

adequately support Marine Corps operational concepts.”<sup>27</sup> However, the study identifies an opportunity to, “Enhance MAGTF fire support capabilities through a top-down modeling analysis leading to the optimum mix of weapons systems.”<sup>28</sup> Despite the revelations of fire support structure concerns noted in several afteraction reports from Desert Storm in 1991, five years have passed without a comprehensive study to balance the fire support capabilities necessary for MAGTFs to fight and win across the complete spectrum of war.<sup>29</sup> To accomplish this challenging task, the focus of effort should be to develop the structure for the MEF to fight and win in a major regional conflict (MRC) scenario. That requires sufficient assets to conduct the “single battle” throughout the close, deep, and rear battle areas and simultaneously provide for overall force protection. After that requirement is met, smaller organizations or lesser operations must use tailored forces from the existing structure to execute their responsibilities. As the Chairman of the Joint Chiefs of Staff, General Shalikashvili stated, “Other operations ... have proved to be possible using forces optimized for wartime effectiveness.”<sup>30</sup> In an era of dwindling resources combined with an ongoing revolution in military affairs, the Marine Corps can not afford to base structural decisions on gut feel or historical precedence to

---

<sup>27</sup>PRC, Inc., Final Report to Marine Corps Combat Development Command, “Mission Area Analysis (MAA) of Mission Area 24 - Fire Support (1995-2005)” (Quantico, VA: 13 March 1996) , 5-5.

<sup>28</sup>PRC, Inc., “MAA of MA 24 - Fire Support (1995-2005) ,” 5-39.

<sup>29</sup>H. W. Evans, Lt Col, USMC, Headquarters Battery, 10th Marines, Report Number 80706-71683, Marine Corps Lessons Learned System, subject: “Artillery Regiment Reorganization” (Camp Lejeune, NC: 23 March 1991) . Also see: Gangle.

Gray, Maj, USMC, 9th Marines, Report Number 02007-88916, Marine Corps Lessons Learned System, subject: “Employment of Light Armored Infantry (LAI)” (Camp Butler, Okinawa, Japan: 4 November 1990) .

Morris, Maj, USMC, Headquarters Battery, 10th Marines, Report Number 31464-58891, Marine Corps Lessons Learned System, subject: “Concept for Artillery Battalion Structure” (Camp Lejeune, NC: 12 March 1991) .

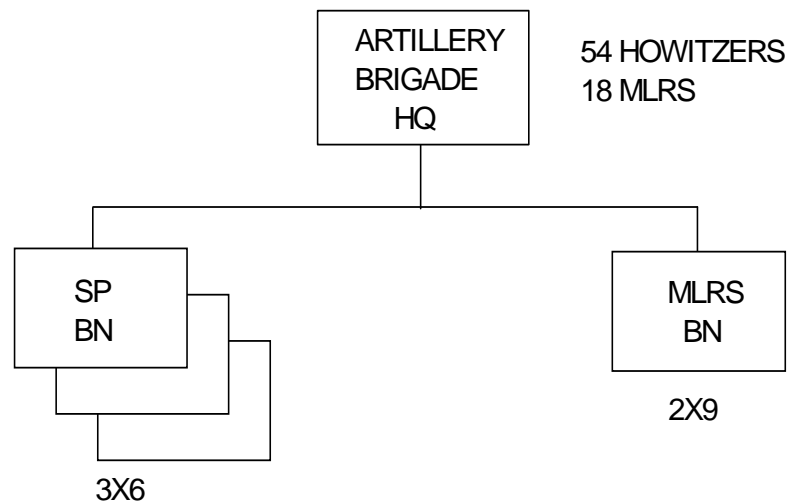
<sup>30</sup>John M. Shalikashvili, GA, USA, “Joint Vision 2010: Force of the Future,” *Defense* 96, no. 4 (July 1996) : 14.



structure a force that can fight and win on the modern battlefield. While the Corps has procrastinated, the U.S. Army has forged ahead in developing doctrine for the 21st century.

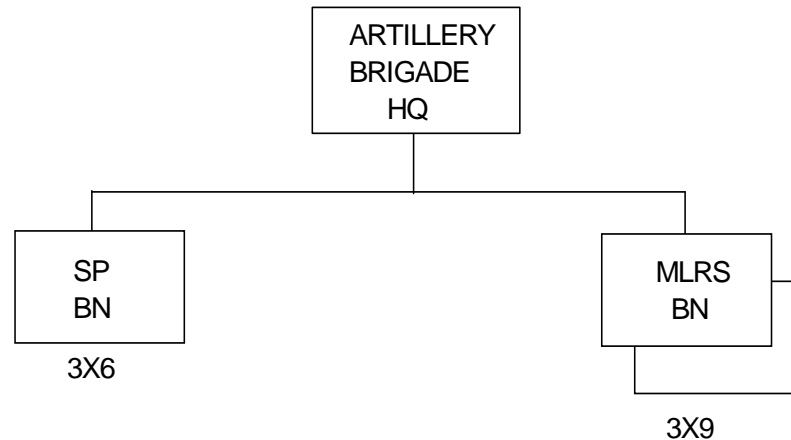
### **Army Doctrine**

Responding to concerns about fire support in Desert Storm and future war scenarios, the Army conducted a study to validate their fire support doctrine at the division and corps. The study, conducted by the Army Science Board, concluded in an October 1995 report that the organic divisional artillery lacked sufficient reinforcing and general support capability. The Science Board concurred with Desert Storm Army commanders that even when an artillery brigade was attached, organic fire support available to the division was inadequate. The final recommendations, approved by the Army Chief of Staff for implementation calls for a heavy division's divisional artillery to consist of three howitzer battalions (3x6) plus a MLRS battalion configured with two batteries of nine launchers each (2x9) as depicted in Figure 4.



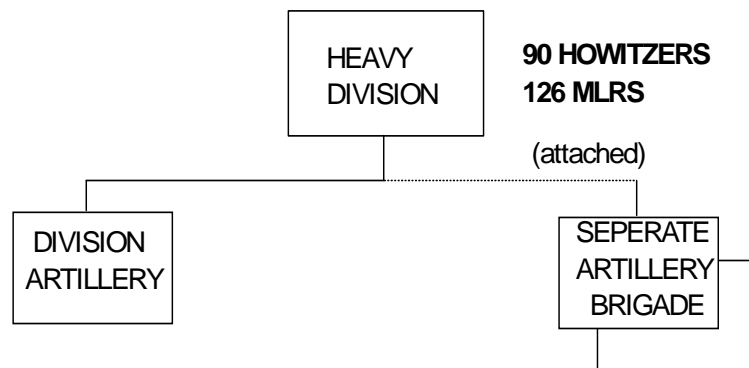
**Figure 4. Army Organic Divisional Artillery for Heavy Division**

In addition to this potent force, two separate brigades of artillery will be attached to each committed division.<sup>31</sup> An artillery brigade for a heavy division contains a howitzer battalion (3x6) and two MLRS battalions (3x9) as depicted in Figure 5.



**Figure 5. Army Separate Artillery Brigade**

The resulting artillery force totals 90 howitzers and an incredible **126** MLRS launchers per division as shown in Figure 5.<sup>32</sup>

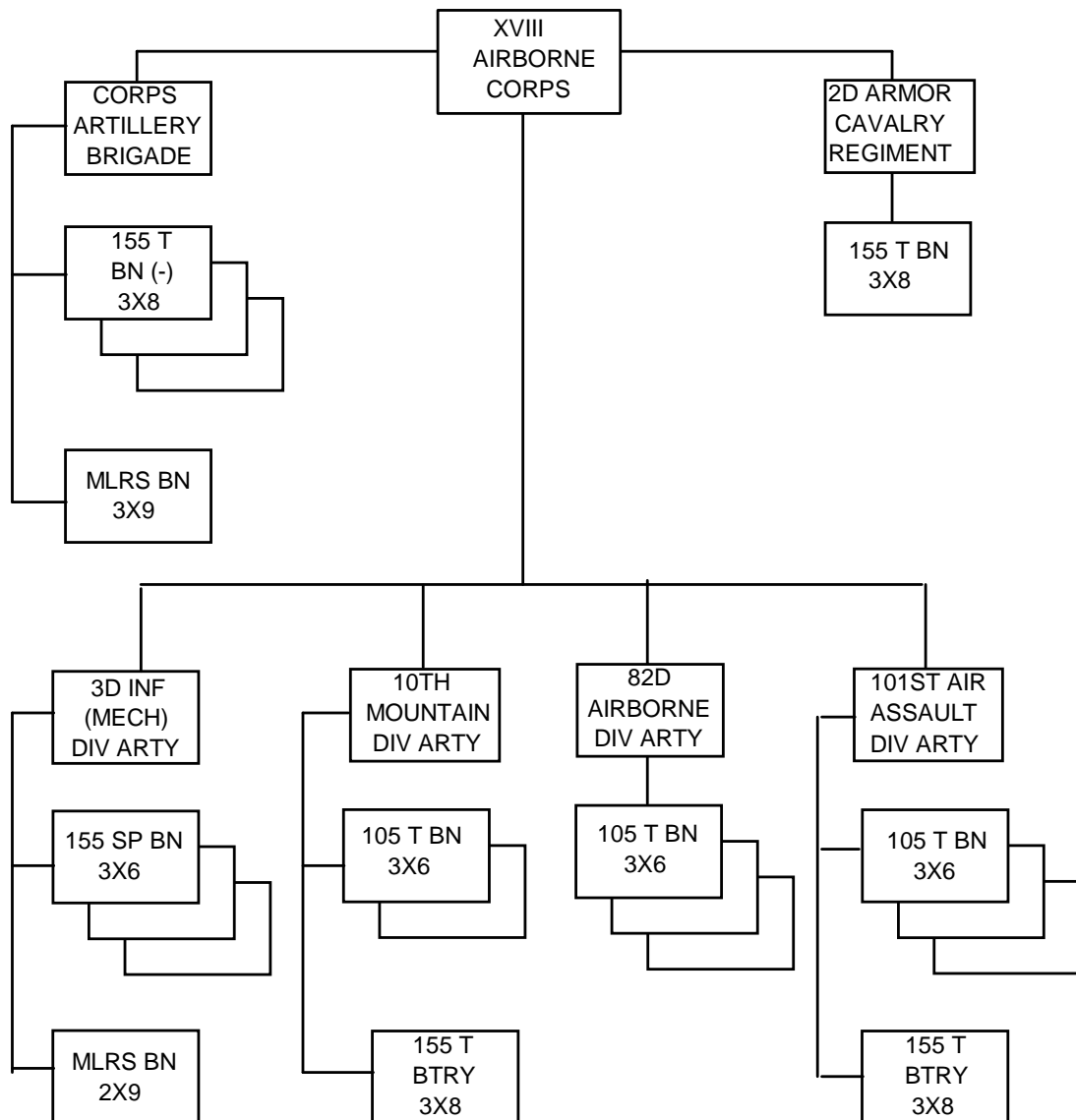


**Figure 6. Army Artillery Allocation for Heavy Division**

<sup>31</sup>Army Science Board, Ad Hoc Study, Executive Summary, subject: "Innovations in Artillery Force Structure," 1996, ii.

<sup>32</sup>Randall L. Rigby, MG, USA, "3x6 Cannon-2x9 MLRS Transition," *Field Artillery Journal* 1, no. 4 (September-October 1996) : 20.

Compare this to the 72 artillery tubes available to a Marine division and the difference in doctrine becomes readily apparent; moreover, a Marine division must share this artillery with higher headquarters (MEF), whereas an Army heavy division's higher headquarters (corps) will possess a brigade or more of cannon and rocket artillery to influence the battle. But is this a useful comparison? While a Marine division is not intended to replicate an Army heavy division's capabilities, a Marine division is more mechanized than initial thoughts reveal. A direct comparison is difficult but, considering the mechanized capabilities provided by the assault amphibian vehicle battalion that can lift four infantry battalions, tank battalion, and LAR battalion, the Marine division possesses at least half and probably two-thirds of the mechanized combat power of an Army heavy division. Extending these factors to artillery allocation provides a rough basis for comparison of artillery fire support assets that would indicate a Marine division equipped with 45 to 60 howitzers and 63 to 84 rocket launchers. Perhaps a look at Army light forces may provide a useful comparison as well.



**Figure 6. XVIII AIRBORNE CORPS  
ORGANIC ARTILLERY SUPPORT<sup>33</sup>**

Artillery support for Army light forces is configured quite differently as shown in the XVII Airborne Corps organic fire support organizational chart depicted by Figure 6. Each “light” division will also receive two separate brigades of artillery (from Army assets external

<sup>33</sup> \_\_\_\_\_. Fire Support Structure Briefing Slide, XVIII Airborne Corps Fire Support Coordination Center, subject: *XVIII Airborne Corps*, 4 March 1997.

from the XVIII Airborne Corps' organic units) to augment its fires. These separate artillery brigades are currently composed of three battalions of M198 towed howitzers (3x8): an additional 144 howitzers augmenting the organic division artillery. However, future revisions may create 3x6 battalions that would add a total 108 artillery tubes for support.<sup>34</sup>

After refining its heavy division fire support doctrine, the Army initiated the Legal Mix VIII Study to review the fire support requirements for light forces. Initial reports indicate that in order to keep the light forces *light*, the primary structural revision will be made in the Corps' Artillery Brigade. The current brigade configuration of three battalions of 155mm towed M198s and one battalion of MLRS will be reversed. The recommended structure will include three battalions of rockets (MLRS or HIMARS) and one battalion of tube artillery.<sup>35</sup> This provides 81 rocket launchers for general support or about a battalion, 27 launchers, per **light** division in addition to organic support. Therefore, considering the overall force structure, a Marine division would reasonably require more fire support assets than an Army light division, but less fire support assets than an Army heavy division.

So why should Marines care what the Army is doing? First, the Army's approach to the twenty-first century serves as a potential model for action to revitalize the Corps' efforts to solve the long standing fire support dilemma.

Secondly, the Marine Corps has requested dual designation of all Army doctrinal artillery publications.<sup>36</sup> Whether the two Services agree on common doctrine remains to be seen.

---

<sup>34</sup>Marine Corps Liaison, Fort Sill, OK, telephone interview by author, 26 March 1997.

<sup>35</sup>Directorate of Combat Development (DCD) Analysis, Fort Sill, OK, telephone interview by author, 14 March 1997.

<sup>36</sup>Randall L. Rigby, MG, USA, "Mapping the Future: FA State of the Branch 1996," *Field Artillery Journal* (November-December 1996) : 3.

However, such a move would help fill the gap in formal Marine doctrine and provide a solid base for future joint operations. Two additional aspects of joint doctrine are relevant.

Doctrine evolves from experience and studies, someone willing to write it all down, and leaders who will follow it. Accepting Army doctrine would tacitly be accepting the studies that helped formulate it.

Force structure evolves from studies and doctrine. If the Marine artillery structure is greatly different from the Army's, the doctrine may be invalid. But, if we accept it and modified only as necessary, the Corps could move on with designing a fire support system of overlapping capabilities that complement joint doctrine without conducting another round of costly studies that erode the time advantages that the U.S. currently enjoys over its adversaries.

Third and by far the most critical reason Marines should care what the Army does, is that the Marine Corps currently relies on the Army for MLRS support to provide reinforcing and general support heavy fires for both division and MEF operations.

### **Structure versus Doctrine Void**

Why does the Marine Corps have to depend on the Army for artillery support? If the Marines deploy two divisions, as they did in Desert Storm, there will be a requirement for several additional battalions of artillery. Reinforcing and general support battalions for just the two divisions would require virtually all of the reserve battalions in 14th Marines. These battalions are all equipped with the M198, 155mm, towed howitzer that may not provide sufficient fires to dominate the modern battlefield. The capabilities that rockets provide cannot be easily matched by tube artillery. Rockets deliver significantly more firepower and add greater depth to the battlefield through greater range. These capabilities enhance the MEF's ability to

shape and fight the single battle and make MEF level reinforcing and general support fires desirable again.

The Marine Corps recognized the benefits of rocket artillery as early as 1980 and recommended the acquisition of MLRS.<sup>37</sup> Rockets would provide the punch to offset the loss of *heavy artillery* due to the retirement of the 8 inch howitzer. The Marines aging self-propelled 8 inch and 155mm howitzers were becoming too expensive to maintain so the three battalions of tracked artillery were reduced beginning in 1989 in anticipation of the planned upgrade to MLRS.

The program was funded in the 94 Program Objective Memorandum (POM) with an additional plus-up of funds authorized by Congress. The 1993 Mission Area Analysis-24 failed to specifically mention general support artillery as a deficiency since the acquisition of MLRS was proceeding well at the time of the conference. But with the drawdown overshadowing military spending, the Secretary of Defense questioned the validity of the purchase and opted for a long term study instead of providing MLRS for the Marines. Politics, poor cost comparisons, and a virtual war on service redundancies robbed the Corps of a much needed capability. The launchers purchased with the congressional plus-up were transferred to the U.S. Army.<sup>38</sup>

With the loss of MLRS, the lack of reinforcing and general support capabilities for the division and MEF created an immediate gap between doctrine and the force structure that had been modified too early in anticipation of MLRS. The most obvious recognition of the growing

---

<sup>37</sup> Force Structure Study Group, Concepts, Doctrine, and Studies Activity Development Center, Marine Corps Development and Education Command, Draft, *Marine Corps Force Structure (1980-1989)*, (Quantico, VA: August 1980), II-50-53.

<sup>38</sup> C. E. Mundy, Jr., Gen, USMC, CMC memorandum for the Chief of Staff of the Army, subject: "Multiple Launch Rocket Launcher Support For the Marine Corps," 8 December 1993.

void between doctrinal support requirements and the capabilities of the diminished artillery force structure surfaced with the Commandant's request for Army support.

### **Memorandum of Agreement**

After the decision to forgo the Marine Corps long planned acquisition of MLRS, Commandant of the Marine Corps, General Mundy, formally requested by letter, on 8 December 1993, "Accordingly, request the Army augment Marine Corps general support artillery with MLRS support when required."<sup>39</sup> The Memorandum of Agreement (MOA), finally approved by the Army on 27 April 1995 and accepted by the Marine Corps on 26 May 1995 (enclosed as appendix B), represents the Services' cooperation and willingness to work together in a joint environment.

However, despite numerous joint field exercises and working groups' efforts to transform the document's intent into a functional reality, several weaknesses remain in the concept of support and the validity of the agreement.<sup>40</sup>

**Permanence.** The most obvious concern with the agreement relates to the signatories of the document. The initial momentum for the agreement stemmed from the service chiefs' personal correspondence, yet the document's approval is at the deputy level. Whether or not this

---

<sup>39</sup>Mundy.

<sup>40</sup>Edward L Hughes, Maj, USA, "Army MLRS Support for Marines," *Field Artillery Journal* (February 1995) : 20-23. Also see:

John A. Dubia, MG, USA, memorandum for Commander, Training and Doctrine Command (TRADOC), subject: "Army MLRS Support to the Marine Corps," 30 June 1994.

W. M. Hoffman, USMC, 11th Marines, Report Number 32131-85706, Marine Corps Lessons Learned System, subject: "Summary - Post Exercise Report for DESFIREX 2-93" (Camp Pendleton, CA: 21 April 1993) .

Patrecia Slayden Hollis, "Joint Fire Support-Training for the Future," Interview with Maj Gen Palm, CG MCAGCC, *Field Artillery Journal* (February 1995) : 6-8



reflects uncertainty about the concept is mere speculation, but it does leave room for doubt. Perhaps the approval level is more closely related to the enduring term of the agreement.

In April 1993, as part of the Armed Services roles, missions, and functions review Secretary of Defense Les Aspin directed the Chairman of the Joint Chiefs of Staff (CJCS) and the Secretary of the Navy (SecNav) to conduct a study on the long-term Marine Corps requirement for general support artillery with a focus on rocket launched artillery. Additionally, Army rocket support for the Marine Corps was to be considered.<sup>41</sup> This led to the Commandant's decision not to purchase MLRS but to request support from the Army. The Commandant's letter implies a permanent support relationship in the statement, "I concur that MLRS support for the Marine Corps is more appropriately provided by the Army."<sup>42</sup> If this was considered a temporary measure, a phrase such as, *at this time*, would most likely have been added. A question also arises from the Commandant's phrase, "augment Marine Corps general support artillery," that implies Marine intentions to field an organic general support capability. While the MOA helps fill the Marines immediate requirements for general support artillery, the document requires renewal every two years. Such a short term agreement indicates the real intent of the Services was to provide a temporary measure to allow more detailed study. How permanent the agreement is may be answered when it comes due for renewal in May 1997. Basing Marine fire support acquisition and structure decisions on such a short term agreement fails to recognize the complexity of the modern procurement process and is very risky for the forces that may be counting on that support. Prior to executing an updated agreement, the Marine Corps must clearly establish what their long-term position really is and craft a document

---

<sup>41</sup>Les Aspin, Secretary of Defense, memorandum for Secretaries of the Military Departments..., subject: "Roles, Missions, and Functions of the Armed Forces of the United States," 15 April 1993.

that provides either permanent support or one that will adequately cover the time necessary to acquire the desired capability.

**Availability.** The agreement provides either a MLRS battery (9 launchers) or a MLRS battalion (27 launchers) from an active or reserve component echelon above division. In either case, the “general support” firepower available to a Marine division or MEF falls far short of the Army’s doctrinal allocation of 126 rocket launchers per heavy division. Nor does the Marine division’s fire support compare with the adjusted representative division with 63 to 84 rocket launchers, a light division’s slice of 27 rocket launchers of the corps artillery brigade, or the historical Marine employment of artillery from WWII to Desert Storm. While one would hope the size of the unit assigned is based on a detailed study of METT-T, it will more likely be based on the availability of those vital units. The Army continues to restructure internally and stress their reliance on Reserve and Guard units to provide up to 66 percent of their fire support units.<sup>43</sup> Combined with their recent decision to double the artillery allocated to a heavy division, MLRS assets may simply not be available to honor the MOA without jeopardizing Army units. Currently the Army has seven Field Artillery (FA) Brigades in the active forces. That allows support of two FA brigades each for three divisions and one FA brigade for each corps. The remaining FA brigades are resident in the National Guard. Those 17 FA brigades give the Army a total of 24 FA brigades to support 10 divisions and four corps.<sup>44</sup> The Army is a strong advocate of *affiliating* reserve units with a specific active duty unit for training and future

---

<sup>42</sup>Mundy.

<sup>43</sup>John J. Todd, and James M. Holt, LTC, USA, “How Much Field Artillery is Enough?” *Field Artillery Journal* (June 1995) : 25.

<sup>44</sup>Todd, 25.

mobilization.<sup>45</sup> But with just enough artillery structure to support their doctrinal allocation, the Army has resisted designating a specific unit for habitual assignment to the Marines.<sup>46</sup> This policy can negate unit cohesion and potentially slow responsiveness and effectiveness in employing critical fire support. After a joint exercise at Twentynine Palms, the attached Army MLRS Battalion Commander noted, “Because 6-27 FA had trained and rehearsed for the connections at home station, the learning curve was significantly shorter.”<sup>47</sup> If the assigned unit comes from the Guard, the mobilization and deployment timeliness may severely limit the speed and tempo of the operation. Once the unit size and availability are determined the command relationship must be determined.

**Command Relationship.** The MOA does not address whether the MLRS unit will be assigned or attached as operational control (**OPCON**) or tactical control (**TACON**). Instead, the MOA leaves this important decision up to the Joint Force Commander (JFC). The difference between the levels of authority is significant. For example, the 2d Marine Division exercised **OPCON** over the attached Tiger Brigade and could therefore reorganize the Brigade’s DS artillery battalion and MLRS battery.<sup>48</sup> This allowed the division commander to place the MLRS battery under the artillery regiment in GS instead of supporting only Tiger Brigade. In addition, the artillery regiment assigned a MLRS platoon (3 launchers) to the 5th Battalion, 10th

---

<sup>45</sup> Army Science Board, Ad Hoc Study, ii.

<sup>46</sup> D. E. Smith, Maj, USMC, memorandum from MLRS working group at Pentagon, subject: “POE-22 Memorandum for the Record,” 26 May 1994.

<sup>47</sup> Robert A. Cline, LTC, USA, “MLRS in USMC Operations,” *Field Artillery Journal* (October 1994) : 47.

<sup>48</sup> Mroczkowski, 8.

Marines GS) to conduct artillery raids against Iraqi positions in late January.<sup>49</sup> TACON would not allow such organizational authority. Without flexible command and control, opportunities for creative exploitation of weapon systems and unit capabilities may be lost. While the MOA provides a short term fix, it leaves too many important issues unanswered to serve as a viable long term plan. The MOA affects the way the Marine Corps organizes, trains, and equips for combat. Waiting for a crisis to develop before determining the availability and command relationship for fire support is courting disaster. But if the MOA is not a viable answer for providing Marine Corps fire support—what is?

---

<sup>49</sup>Andrew F. Mazzara, Lt Col, USMC, “Artillery in the Desert, 1991: Report #1,” *Marine Corps Gazette* 75, no. 4 (April 1991) : 53-54.

## CHAPTER 4

### THE THREAT

Throughout most of the Cold War the structure of the American military was based on the threat posed by the Soviet Union. With its demise as a superpower, the public demand for the long awaited peace dividend drove a massive restructuring of American military power. To focus the restructuring dilemma, a new concept evolved that based structure on the capabilities necessary for specific tasks vice specific enemies.

#### Enemy Threat

In the absence of a single peer competitor, the force structuring strategy settled on building the capability to fight, and of course win, two nearly simultaneous major regional conflicts (MRC). The current national security strategy seeks to stabilize the global political scene through selective *engagement* while using the advantage of the existing power vacuum to spread democracy (*enlargement*).<sup>50</sup> Actual historical results in the early 90's indicate a significant increase in military involvement at the lower end of the conflict spectrum. However, the proliferation of terrorism and the availability of modern weapons calls for a modern, well-equipped Marine Corps to project American power to provide that stabilizing influence in an increasingly complex world. By the turn of the century, over 40 countries will field artillery systems that outrange the Marine Corps' M198.<sup>51</sup> Many of these countries are potential adversaries. Failing to modernize the current fire support system could seriously jeopardize the

---

<sup>50</sup>U.S. President, *A National Security Strategy of Engagement and Enlargement* (Washington, DC: GPO, February 1996) , 7, 8.

<sup>51</sup>Rick L Hueston, CPT, USA, "The Threat—Why Modernize FA Cannons?" *Field Artillery Journal* (May-June 1996) : 44.

Marine's ability to accomplish their mission and fail the CINCs that are depending on that capability. For the Marine Corps, the capability must exist to fight at the top end of the spectrum of conflict and, as the nation's forward deployed forces, rapidly apply such overwhelming combat power to stifle any over-zealous foe.

### **Domestic Threat**

Several aspects of the domestic environment play critical roles in the shaping of future Marine Corps capabilities and structure. Most notable among them are widely varying political philosophies that impact funding priorities.

**Money.** The threat at home takes many forms that, for the most part, all revolve around money. After years of deficit spending to create and maintain a military force capable of deterring the Soviet threat of global domination, the American public's demand for reduced spending pits the Services' procurement programs against one another for a shrinking pool of funds. Procurement programs are heavily scrutinized and require detailed studies to justify and validate their requirement. Often as part of this process, the roles and missions of the Services provide a fertile battlefield for discussion.

**Roles and Mission = Structure.** The roles and missions of the Services drive the requirements for certain enabling capabilities that in turn focus the development of force structure, doctrine, and equipment procurement. Maintaining a balanced force in this complicated process is further challenged by the current evolution/revolution in military affairs. Minor changes in one area can send ripples cascading throughout the force. This asymmetrical

reaction demands caution and near precision timing in implementing changes. The Marine Corps appeared somewhat buffered from the wide variances in force structure experienced by the other services during the Bottom-Up Review of 1993 since its structure is guaranteed by law. However, funding is not guaranteed so structure and manning levels become vulnerable to cuts to provide funding for readiness and modernization. Elliot Cohen, a Professor of Strategic Studies at the Paul H. Nitze School of Advanced International Studies, Johns Hopkins University, predicted in 1995 that, “Further force structure and end-strength reductions (perhaps as great as 30 percent below the Bottom-Up Review), will be necessary if the United States is to maintain the edge in fielded military technology that will enable it to dominate potential opponents.”<sup>52</sup>

The Quadrennial Defense Review is currently in session and Cohen’s dire predictions will be tested. Over-reliance on capabilities provided by another service may greatly increase the risk that those assets may not be available as each service tries to maintain that critical balance between forces, equipment, and the money available. As the Services become more fiscally constrained, any excesses not specifically mandated by the roles and missions assigned will certainly be reduced to balance other shortfalls. From the Army’s perspective the mission is what matters—not the MOA. To be assured of Army MLRS support for the Marine Corps, a tasking should come from the Secretary of Defense in the Joint Strategic Capabilities Plan (JSCP) that directs the service chief as the commander responsible per Chapter 6, title 10, United States Code and DOD Directive 5100.1 to train and equip his force for specific tasks. While CINCs have the authority to organize assigned forces, limited assets may preclude additional support for Marines. Based on the tasking the Army would fund, organize, and equip

---

<sup>52</sup>Eliot A. Cohen, “Airpower, the Next War, and the Marine Corps,” *Marine Corps Gazette* 78, no. 11 (November 1995) : 38-44.

a specific unit identified for service with the Marines and many of the questions concerning the MOA would be answered. This approach closely parallels the British Army provision of a **dedicated** artillery regiment (consists of 3 batteries, each with six, 105mm towed howitzers that equates to a U.S. battalion) to provide primarily direct support for the Royal Marines. However, these Army artillerymen must qualify as Commandos by completing the Royal Marines training program.<sup>53</sup> This type of inter-service support may have been what Senator Sam Nunn had in mind when he raised the issue of service redundancies.<sup>54</sup>

**Duplication, Redundancy, or Necessary Capability.** The Goldwater-Nichols Defense Reorganization Act of 1986 required periodic reviews of the Services' roles and missions and was to specifically focus on unnecessary duplication of effort. What was deemed *unnecessary* was largely ignored until Senator Nunn brought attention to it in a 1992 floor speech to the U.S. Senate. The Senator focused his concerns in 10 areas of *duplication* that were so broad as to encompass virtually the entire military establishment.<sup>55</sup> As the Senator's proposal gained momentum, the Chairman of the Joint Chiefs of Staff, General Powell, supported the status quo and asserted that:

Marine Corps expeditionary forces are organized and equipped for a full range of crises that require operations from the sea....The capabilities of the contingency and expeditionary forces in the Army and Marine Corps provide decision makers with valuable alternatives and should be retained.<sup>56</sup>

---

<sup>53</sup> Andy Maynard, Maj, British Royal Marines, interview by author, 10 March 1997.

<sup>54</sup> Senator Sam Nunn (Georgia), "The Defense Department Must Thoroughly Overhaul the Services Roles and Missions," Floor Speech, U.S. Senate (2 July 1992), 102d Congress, *Vital Speeches* 58, no. 20 (1 August 1992) : 621.

<sup>55</sup> Senator Nunn, 620.

<sup>56</sup> Department of Defense, *Chairman of the Joint Chiefs of Staff Report on the Roles, Missions, and Functions of the Armed Forces of the United States* (Washington, DC: Pentagon, 1993) , III-36, 37.



The Chairman also stated that the way the Marine Corps integrates artillery into its maneuver forces *inextricably* links it with the Marine infantryman. However, his position changed somewhat concerning MLRS. He conceded possible advantages if MLRS was provided by the Army, but that decision warranted an in-depth cost and effectiveness study of the Corps requirement for general support artillery and the impact it would have on the Army.<sup>57</sup> Although in other fire support areas he found that the unique capabilities of the four separate air forces--served the nation well.<sup>58</sup> Possibly as a concession to the political tides of change, the Marine's MLRS purchase was offered as the sacrificial lamb instead of waiting for the various studies to be completed. Overall little else changed, but to resolve this issue and many others, the Roles and Mission Commission was created by Congress in May 1994. The White Commission, as it is also known, was absolutely adamant in its view of service roles and missions and the relationship with service redundancies:

Perhaps our most surprising conclusion is this: fundamentally, it is a mistake to take traditional "who gets to do what" view of roles and missions that concentrates on the Military Services. Rather, the emphasis should be "who needs what" in terms of joint military capabilities....Each service is fully engaged in trying to deliver to the CINCs the best possible set of its *specific* air, land, and sea capabilities. A conventional criticism of the Services – unrestrained parochialism and duplication of programs – is overstated.<sup>59</sup>

This represents a paradigm shift from the views of the Nunn led attack on redundancy. The report further stated that the perceived roles and mission problem between the Army and Marine Corps, "are not problems at all." To implement this change in ideology, the study focused on core competencies that lead to warfighting capabilities. The commission identified some core

---

<sup>57</sup>Department of Defense, *Chairman of the Joint Chiefs of Staff Report*, III-37, 38.

<sup>58</sup>J. Lancaster, "Military Reshaping Plan is Short of Clinton's Goals," *Washington Post*, 13 February 1993, Sec. A4.

<sup>59</sup>Department of Defense, *Directions for Defense: Report of the Commission on Roles and Missions of the Armed Forces* (Washington, DC: GPO, 1995) , 1-4.

competencies with specific Services and made recommendations to eliminate Marine Corps ground-based medium-altitude air defense and non-expeditionary engineering capabilities.<sup>60</sup> But there was no mention of artillery or fire support capabilities as core capabilities of any one service other than the need to improve interoperability and operational flexibility of munitions. In a continuing evaluation of close air support (CAS) the Commission found, “Today, CAS is performed by all Services. In our view, this is appropriate. CAS is a vital capability that complements other fire support options.”<sup>61</sup> CAS, like artillery and rockets, provides the same capability to attack close targets. The study drives the point home again, “In areas of apparent overlap, such as forced entry, the two Services [Army and Marine Corps] provide complementary rather than duplicative capability.”<sup>62</sup>

The current Chairman of the Joint Chiefs of Staff (CJCS), General Shalikashvili, also makes it clear in his concept paper, *Joint Vision 2010: Force of the Future*, that, “Any efficiencies garnered by our offensive systems must be underwritten by appropriate *redundancies* [emphasis mine] to safeguard against unanticipated technological, strategic or operational surprise.”<sup>63</sup> So some types of redundancy are complementary and actually sought. It appears the intent of reducing costs by eliminating redundancy has lost much of its momentum since, taken to the extreme, eliminating redundancy could lead to a single *purple* force. This may be the approach America chooses in the future, but such a change should be deliberate and

---

<sup>60</sup>Department of Defense, *Directions for Defense*, 2-20, 2-29.

<sup>61</sup>John Gordon, IV, LTC, USA, “Deep Attack and CAS--Joint Roles and Missions,” *Field Artillery Journal* (November-December 1995) : 9.

<sup>62</sup>Department of Defense, *Directions for Defense*, 2-29.

<sup>63</sup>Shalikashvili, 12.

not done piecemeal or as a function of mission creep. When essentially like equipment is utilized by two Services there are cost savings, and with common training in one school the Services gain joint understanding—not increased costs. The bottom line is MLRS is only cheaper when provided by the Army *if* there are fewer systems and servicemen overall, and this jeopardizes the balance and availability of fire support for both Services—which is a pretty high price to pay.

**Technology.** In the hands of enemies technology is certainly a threat to mission success and has already been discussed. But our own technological advances can present a threat to our capabilities because the rapid pace of innovations and advancements in weapons technology has the potential to create gridlock in our procurement process. What is cutting edge technology today may be completely outdated and irrelevant with tomorrow's invention. Or, the weapon may be obsolete by the time it emerges from the long procurement process and is finally fielded. Combine these concerns with the diminishing budget problems and rapid advancements may actually create a reluctance to modernize.

Not only are leaders subject to this phenomenon, but industry may become cautious investors in the research and development (R&D) process for weapons unless there is a potential civilian application or the profit potential is irresistible. As profits rise to encourage industry, the weapons' costs climb even higher and fuel the buyers' concerns about investing.

As a starting point to break this cycle several processes must be improved. The development-to-fielding time must be shorter. Simplifying the procurement process could take years off the cycle. Smaller buys can lessen the risk for the buyer, but R&D costs will increase for the developer and must be funded. But most importantly, engineers must design modular systems that can more easily be upgraded to maintain ready, relevant, and capable weapons. The

unique nature of rocket systems imbeds most of the technology in the rocket vice the launcher. The launcher is a relatively simple device (tracked or wheeled) with a modular fire direction/control system attached. Therefore, rockets, like the versatile F4 Phantom, can provide cutting edge technology throughout the lifecycle of the system.

**Time.** The element of time has many facets that impact the application of fire support and the systems development process. Responsiveness is absolutely critical for effective fire support in the tactical sense and must receive greater emphasis in the strategic realm of deployment. Forward deployed and expeditionary forces fulfill the national security strategy's goals of engagement and enlargement by utilizing combat power to deter, prevent, or overwhelm any adversary. Presence, speed, and firepower are essential ingredients to accomplish any or all of these objectives of national power. Anything that deters or lessens tempo may threaten the mission; therefore, fire support systems must be available when and where needed and not degrade momentum due to unresponsive force structure.

## CHAPTER 5

### MARINE CORPS FIRE SUPPORT CHALLENGES

The Marine Corps Master Plan (MCMP) 1994-2004 establishes the requirement for the “capability to provide and sustain air and surface fire support with sufficient responsiveness, accuracy, mobility, and range to support troops in close contact, to counter enemy fire support, and add depth to the battlefield.” Also, the top priority equipment issue for mission area 24, Fire Support is to, “Field a multiple launch rocket system.”<sup>64</sup> This capability should receive the same high priority focus in the draft MCMP for 1997 and rank as one of the overall top priorities for combat development. Concurrently meeting the operational mission, fire support providers must adapt to the near-term and long-term changes ushered in by the ongoing RMA in the fiscally austere years ahead.

#### **Maneuver Support**

The changing tactics at division level that emphasize maneuver and a non-linear battlefield create more requirements for direct support fires. The older tactics of two-up and one-back, or maintaining a large tactical reserve, are giving way to newer approaches that maximize committed forces to rapidly overwhelm the enemy. As maneuver forces grow smaller in size this approach may be a necessity instead of an option. Doctrine states that artillery is **never in reserve**; therefore, the artillery battalion that would provide the habitual direct support for a maneuver regiment held in reserve could be assigned other missions: GS, GS-R, or R.<sup>65</sup>

---

<sup>64</sup> Headquarters United States Marine Corps, *Marine Corps Master Plan 1994-2004* (Washington, DC: 21 July 1993) , 4-5, II-23.

<sup>65</sup>FMFM 2-7, 2-5. Also see: FMFM 6-9, 2-8.

That artillery battalion would normally have an on-order mission to return to DS when the maneuver regiment in reserve is committed. This flexibility allowed maximum fire support at all times, but with no maneuver units in reserve, and fewer artillery battalions, all artillery may be committed to DS missions and none allocated for the other three tactical missions. The lack of adequate fire support for the defined missions assigned to LAR is examined in detail in a monograph by Major John Priddy who states neither procedural nor structural changes have occurred to provide the necessary fire support critical for LAR battalions' mission success.<sup>66</sup>

As the concept of single battle with the MEF as the warfighter matures, the role of deep attack artillery must be resolved to properly structure the force. Although the Roles and Missions Commission grappled with the deep fires controversy, it was not resolved and additional studies continue.<sup>67</sup>

**Force Fires.** The Commanding General I MEF, Lieutenant General C. W. Fulford, stated in a letter to the Combat Development Command his desire for the capability to establish a force artillery headquarters with both deep and close attack indirect fire systems to enhance shaping operations in a wider range of operational and weather conditions.<sup>68</sup> This scenario calls for employment of the Marine reserve artillery regiment as the MEF Force Artillery Headquarters with the battalions of the 14th Marines and Army augmentation units from implementation of

---

<sup>66</sup>John R Priddy, Maj, USMC, *Adding Thunder to the Lightning[Lightning]-Greater Firepower for the Light Armored Infantry Battalion*, Monograph, School of Advanced Military Studies, United States Army Command and General Staff College (Fort Leavenworth, KS: 26 March 1990) , 1. Monograph No. AD-A234 154, Defense Technical Information Center (Fort Belvoir, VA: 1991).

<sup>67</sup>Department of Defense, *Directions for Defense*, 2-27.

<sup>68</sup>C. W. Fulford, Lt Gen, USMC, CG I MEF memorandum to CG Marine Corps Combat Development Command, subject: "Fire Support Requirements for the MEF," 13 January 1997.

the MOA as the firing elements. This may prove to be the most viable method to provide force artillery and employ Marine reserves in a complementary instead of duplicative role. The concept of employment was fully developed in a point paper by Colonel L. A. Stuart, Commanding Officer, 14th Marines.<sup>69</sup> While the Marine units are in the Time-Phased Force and Deployment Data (TPFDD) for I MEF's major contingencies, the additional Army MLRS unit is not identified or listed in the TPFDD. This continues to be a major flaw of the current MOA with the Army.

**Combined and Coalition Warfare.** Another area that should be considered involves the provision of fire support in combined and coalition warfare. Many of our nations' friends around the world maintain Armed Forces that are infantry heavy, but they are very limited in combat support forces or possess outdated equipment. As forward deployed forces composite with these forces, a serious critical vulnerability could develop. Whether as a military necessity or as political support, the senior level U.S. commander should have sufficient fire support assets to provide an umbrella of protection for the overall force. As a responsible military partner, the U.S. should not allow a friendly force to "falter in its assigned mission" for lack of adequate fire support while under U.S. command.

**Maritime Prepositioned Force (MPF).** The growing focus on maritime prepositioned force (MPF) operations offer a viable complementary capability to forcible entry. The speed of deployment and firepower available can play a vital role in buying the time and space necessary for the buildup of follow-on forces. The current MPF configuration will provide 5 artillery

---

<sup>69</sup>L. A. Stuart, Col, USMC, CO 14th Marines, Point Paper, subject: "Force Artillery Headquarters Concept," 28 June 1995.

batteries of M198, towed howitzers for a total of 30 tubes per MPF squadron.<sup>70</sup> The overriding factor affecting MPF is not just the size and quantity of equipment as is the case in most deployments. For MPF operations, the number of personnel required to provide a needed capability becomes a major factor as forces are flown into the theater. In this respect the massive firepower available from rocket systems combined with significantly fewer personnel requirements yields a significant force multiplier. To enhance the Marine's expeditionary capability for force projection, the artillery complement of the MPF load should be increased to include rocket artillery to significantly increase firepower and reduce the personnel footprint that is critical in the early stages of combat power buildup. Answers or decisions on these important aspects of fire support will allow the development of a more balanced capability to support and enable maneuver forces in the joint, combined, and coalition warfare of the future.

### **Balancing Fire Support: Air, Sea, Ground Based**

The 1993 Mission Area Analysis (MAA) 24 - Fire Support claimed that the process of reducing fire support units would be in the correct proportion to the maneuver units supported. As discussed, the subsequent loss of MLRS precludes this. The review further stated that the reduction of fire support units would be "generally proportional." This implied that the reductions would be distributed to maintain a proper balance of capabilities. However, some areas were identified for special consideration and study. These areas included general support artillery, naval surface fire support, air reconnaissance, automated assistance for fire support coordination, fire support coordination training and doctrine, and an overall review of the

---

<sup>70</sup>Navy Marine Corps (NAVMC) 2907, *Maritime Prepositioning Force (MPF) Prepositioning Objective (PO)* (Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps, 15 April 1996) , C-12.



Marine Corps **concept of fire support**. The last entry from a prioritized list of 84 deficiencies identifies a lack of doctrine that determines how many howitzers and aircraft are required to support various sizes of MAGTFs.<sup>71</sup> By the time the 1995 MAA-24 met, this shortcoming was reflected in the number 1 deficiency, “Marine Corps ground fire support assets do not adequately support Marine Corps operational concepts.”<sup>72</sup> Finally, the problem of making major structure changes without a solid base of supporting doctrine was realized—although too late. The 1995 review closed with a stated opportunity to, “Enhance MAGTF fire support capabilities through a top-down modeling analysis leading to the optimum mix of weapons systems.”<sup>73</sup> This would certainly be a complicated study to produce and have an immense impact on the future force structure. It probably could not provide all of the answers needed, but it could create a foundation to evaluate a proper balance of forces and capabilities. Some specific areas of concern relating to the various arms providing fire support follow.

**Aviation.** Several situations may significantly affect the historical support the Marine Corps has enjoyed from its organic aviation assets. First, and perhaps the most significant was the 1986 Omnibus Air Agreement that has now been incorporated into joint doctrine. The policy is often interpreted as assuring the Marines first call on organic air, but that is not what it states. The policy merely cautions that Marine air is vital to the landing force, but it gives the Joint Task Force Commander the full authority to not only task excess sorties, he can take all air and place it under a Joint Force Air Component Commander. To Marines, this may seem unfair and irresponsible. However, as maneuver warfare teaches, the preponderance of support must be focused on the main effort and not part of a piecemeal approach. The current lack of a general

---

<sup>71</sup>John Narney and others, PRC, Inc., “MAA of MA 24 - Fire Support (1993-2003),” 1, 20.

<sup>72</sup>PRC, Inc., “MAA of MA 24 - Fire Support (1995-2005),” 5-5.

support artillery capability exacerbates the impact of any loss of tactical air assets. Whether Marines, like it or not, that is the joint doctrine.

Secondly, the significant reductions in the overall numbers of aircraft in every service limit the availability for all functions of aviation. The move to a single, multirole fighter will further strain the apportionment process even as it increases the flexibility of the force overall. Instead of a dedicated attack platform, aircraft can be siphoned off for a multitude of other missions. The fielding of the Advanced Tactical Air Reconnaissance System (ATARS) for the F/A-18 will provide a much needed reconnaissance capability, but that can mean fewer close air support (CAS) sorties. An artillery capability for deep interdiction would help to maintain flexibility and balance.

The third issue involves the ongoing debates and studies concerning the deep versus close battle. There are a growing number of theorists who view the focus on CAS as reactionary and an outdated concept in future war. The Marines FMFM 5-42, *Deep Air Support*, states, “The MAGTF commander uses DAS [deep air support] to attack enemy forces before they become a threat to MAGTF units. Attacking enemy forces with DAS can prevent them from becoming CAS or CIFS [close in fire support] targets....Ideally, all targets attacked by the aviation combat element (ACE) would be DAS targets.”<sup>74</sup> It is difficult to evaluate the validity of the arguments without the context of METT-T, and ultimately the commander’s concept of shaping and protection will be transmitted in the apportionment decision. But whoever that commander is (JTF, JFACC, MAGTF, or ACE), his personal concerns and biases will shape his

---

<sup>73</sup>PRC, Inc., “MAA of MA 24 - Fire Support (1995-2005),” 5-39.

<sup>74</sup>Fleet Marine Force Manual (FMFM) 5-42, *Deep Air Support* (Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps, 4 March 1993) , (1-1)-(1-3).

vision of the preeminence and priority of the close or deep battle, making balanced capabilities even more important for flexibility without sacrificing protection.

**Naval Surface Fire Support (NSFS).** In his 1993 study on naval surface fire support (NSFS), LCDR Morgan, USN, determined that the surface Navy could not effectively provide fires in support of forces ashore.<sup>75</sup> With the explosion of technology and a major shift to refocus on naval warfare in the littorals the Navy has started to develop an impressive array of ships and systems to address the shortfall in support. The impact of technology, such as missiles and rockets, is notable in the name revision to naval surface fire support from what was called naval gunfire. Naval programs such as, the arsenal ship, extended range guided munitions (ERGMs) for the 5 inch gun, a 155mm projectile for interoperability of ammunition, and a naval land attack missile (basically the Army tactical missile system (ATACMS) indicate a strong commitment by the Navy to the Operational Maneuver from the Sea concept. The primary concern remains in integrating these systems into the overall force based on the projected timeline of initial operations capability by 2010 and full capability by 2014.<sup>76</sup>

**Ground Based Systems.** Certainly ground systems include more than artillery. Infantry mortars play a vital role for close fire support. Since the 4.2 inch mortar was taken out of service by the Marine Corps during 1970-1971, there have been proponents of a heavier caliber

---

<sup>75</sup>Clarence Todd Morgan, LCDR, USN, *Naval Surface Fire Support: How Can We Get There From Here?* Monograph, Marine Corps Command and Staff College (Quantico, Virginia: 1993), 1.

<sup>76</sup>P. K. Van Riper, Lt Gen, USMC, CG Marine Corps Combat Development Command letter to Chief of Naval Operations (N86 and 85), subject: "Naval Surface Fire Support for Operational Maneuver From The Sea," 3 December 1996.

infantry weapon.<sup>77</sup> A viable option would be a battalion of 120mm mortars organic to the infantry regiment.<sup>78</sup> The Army is fielding a towed and carrier-mounted 120mm mortar to replace the 4.2 inch system. The current range is 7,240m for a 30 pound round, but range will increase with a new family of ammunition that includes DPICM and a precision guided round that can kill armor.<sup>79</sup> Organizing as a mortar battalion organic to the infantry regiment would provide the capability to **mass** fires in support of the regiment's main effort. A towed version, with a HMMWV (or vehicle that can fit internally in the MV22) as prime mover, could best serve Marine infantry. Mechanized versions of the 120mm mortar (internally mounted or towed by the AAV or LAV) would significantly improve the organic fire support capability of the LAR and tank battalions. The towed system has great expeditionary applications and is easily airmobile. A battery of 120 mortars could be attached to the BLT/MEU for smaller operations and deployments. But mortars can not compare with the capabilities of medium artillery and should not be considered a substitute for the direct support artillery battalions. As an organic infantry weapon, the structure to staff it would most likely require a trade-off of either the 60mm or 81mm mortars from the company or battalion mortar assets.

As the primary focus of this paper is artillery, the issues of balance have largely been explored. Technology continues to provide enhancements for tube artillery. Lighter guns enhance mobility, and the Lightweight 155mm Howitzer Program has completed the firing

---

<sup>77</sup> Buckner, 105. And: Cosmas, Appendix G.

<sup>78</sup> The 4.2 inch mortar was originally organized in this fashion during the Korean Conflict, but was moved to the artillery battalion during the Vietnam War.

<sup>79</sup> Project Manager's Office, U.S. Army Mortar Systems, Picatinny Arsenal, NJ, telephone interview by author, 11 March 1997.

competition and named Textron/Vickers as the winning contractor. But despite its improved mobility, this new gun is not a panacea for air-mobile artillery operations.

Air-mobile artillery was first used in Vietnam to expand fire support coverage by overcoming obstacles to maneuver and positioning presented by the terrain, jungle vegetation, weather, and poor or nonexistent roads. This tactic worked well in support of a static environment dominated by heavily defended fire bases. Once emplaced, artillery units would remain in fixed positions for extended periods. In a more mobile, fluid battlefield, separating artillery from its prime movers increases vulnerabilities, strains logistical support, and entails immense risk. Despite this, there are circumstances that may require the advantages of speed, mobility and flexibility offered by an air-mobile artillery capability.

The Marines can only lift the M198 with the CH 53E heavy-lift helicopter. The LW 155 artillery piece matches the firing characteristics of the M198, but it weighs less than 9,000 pounds. The reduction of almost 7,000 pounds will allow the medium lift MV 22 Osprey to transport the LW 155 as an external load under most conditions. This offers the advantage of significantly more assets available that could be scheduled for an artillery airlift and subsequent resupply or repositioning. However, the complexities of air-mobile artillery operations are only slightly reduced by the acquisition of the LW 155 and the MV 22.

The added flexibility offered does not decrease the multiple trips necessary to move such an equipment intensive combat arm such as artillery. The external load will also half the top-end speed of the MV 22. This may slow operational tempo and create additional taskings for escort packages to protect the slower formation. Finally, without **dedicated** air transportation, the artillery may be stranded without organic prime movers or become subject to weather or other conditions that effect flight operations.

But the truly technological boom for ground based fire support systems lies in the future of rockets and missiles. There are two areas of concern here that are relevant to the balancing problem. First, tactical ballistic missiles can be subject to the provisions of the various arms reduction and limitation treaties based upon their range capability.

Secondly, the Department of Defense's (DOD's) Deep Attack Weapons Mix Study (DAWMS) will explore total numbers of deep attack systems required and the C4I relationships necessary to integrate the fires. The greater ranges of these systems require airspace management that may involve a complicated JFACC process that could slow, delay, or deny target attack. This involves another aspect of the controversial positioning of a Fire Support Coordination Line (FSCL), and the supporting-supported concept of command relationships.<sup>80</sup>

The FSCL requires a shift in coordination of battlespace responsibilities between the close and deep battle. Positioning the FSCL to favor the close battle may restrict the flexibility for the deep battlespace commander, but if the FSCL is positioned to favor the deep battle the close battlespace commander's ability to maneuver and engage targets may be constrained.

The DAWMS spawned another continuing study to look at the close battle termed the Close Support End-to-End Analysis (CSEEA) for ranges less than 40 kilometers. The connectivity of these two studies should highlight the flexibility of rockets and missiles. Both studies will provide recommendations to determine the optimal numbers of attack platforms to the Quadrennial Defense Review (QDR) and National Defense Panel (NDP) for their report to the Secretary of Defense and Congress on the proposed structure of the Armed forces through 2004.

---

<sup>80</sup>Gordon, 8-9.

**Combined Arms.** The essence of balance is summed up by Colonel Wyly in his article, *Hunters From the Sea*, “We do not simply push the enemy around the battlefield, as when we use only a surface or air arm. Instead, we quickly surround him and overwhelm him—physically as well as psychologically.”<sup>81</sup> With a well-balanced asymmetrical attack, we can rupture the enemy's cohesion, and maintain our freedom of action. There is immense potential in the synergism developed by a balanced force of mutually supporting, integrated, and well-coordinated variety of fire support assets. Just as fires enable maneuver (and vice-a-versa), supporting arms enable and enhance the capabilities of each separate system by covering the inherent limitations each has. As the Services embrace the joint environment of the 21st century, the benefits of cohesively working together should be obvious. Sufficient ground based fire support assets can free-up the unique maneuverability of air power, or the massive lift and sustainment ability of sea power. Over-reliance on any one arm may present a critical, high value and high payoff target for the enemy to exploit. Reconstructing a properly balanced and modern fire support *team* must be the primary focus now while maintaining a vision of the future challenges, capabilities, and opportunities.

### **Future Concepts**

The centerpiece document that provides the future vision for the Marine Corps is, *Forward From the Sea*. It introduces the concept of **Operational Maneuver From the Sea** currently tested as **Sea Dragon** at the Commandant’s Warfighting Lab in Quantico, Virginia.

---

<sup>81</sup>Michael Wyly, Col, USMC (Ret.) and Daniel E. Moore, Jr., CDR, USN, “Hunters from the Sea,” *U.S. Naval Institute Proceedings* 121/12/1,114 (December 1995) : 33.

The focus is on capitalizing on the technological revolution to produce future war concepts and doctrine that will actually usher in the revolution in military affairs. The new concepts for over-the-horizon, unopposed landings; sea based logistics; force protection policies, and power projection in the information age present formidable challenges to the fire support community. But the rapid advances in technology may be just as challenging to integrate and coordinate space based and loiter weapons, suites of sensors and unmanned aerial vehicles, fused see and shoot systems, and other equally fascinating potential systems.

One futuristic study conducted by the Defense Science Board developed a bold new expeditionary concept based on the capability to, “mass fires rather than forces.” This was in response to their view that, “The U.S. may increasingly face situations where our military leverage is perceived to be either too vulnerable or too slow. Thus, unless we can *increase the effectiveness and robustness of rapidly deployable fire, the U.S. will lose considerable freedom of action to support its global interests*[emphasis mine].”<sup>82</sup>

In the near term, there have been significant improvements in weapons’ ranges, accuracy, and variety that impact our current capabilities and also have the potential for up-grades to make a cost effective transition to the future military requirements and capabilities. The OMFTS Assessment Conference identified the mobility and range of current ground-based indirect fire systems (including the light weight (LW) 155 howitzer), and the resulting effect on responsiveness, as the number 2 deficiency of 21 prioritized capabilities required to execute the operational concept.<sup>83</sup>

---

<sup>82</sup>Defense Science Board 1996 Summer Study Task Force, Volume 1 Final Report, *Tactics and Technology for 21st Century Military Superiority* (Washington, DC: Office of the Secretary of Defense, October 1996) , cover letter, II-3.



## **Fire Support Studies**

One of the greater challenges fire support must overcome is to develop appropriate doctrine, create a balanced force structure, and properly equip those forces for modern warfare. Along with revisions to the procurement process, a new process to assign and conduct studies should be considered. The current study process is a self-perpetuating industry. The main recommendation of most of these studies is to conduct another study. The studies are too shallow, too slow, and are not integrated well with other studies. The Cost and Effectiveness Analysis for the Marine Corps General Support Artillery Study (MCGSAS) make two recommendations—conduct two additional analyses.

The overemphasis on numerical analysis is akin to trying to win the Vietnam War by focusing on the body count—it does not work! There are so many factors that do not lend themselves to a quantitative study that are not even mentioned as a consideration: breaking the enemy's will, weighting the main effort, or the psychological impact of an artillery barrage (on both sides).

The Marine Corps General Support Artillery Study was directed by the Secretary of Defense in April 1993 to analyze the long-term general support artillery requirements for the Marine Corps. Research began in January 1994 and was completed in November 1995. The study was renamed to *Analysis of Amphibious Assault Fire Support Requirements* and was conducted utilizing a wargame by the TRADOC Analysis Center-White Sands Missile Range. The study analyzed the fire support structure of the 80s, the present period of 94-99, and the

---

<sup>83</sup>PRC, Inc., Draft Final Report to Marine Corps Combat Development Command, *Operational Maneuver From the Sea (OMFTS) Mission Area Analysis (MAA)* (Quantico, VA: 18 December 1996) , D-12.

future from 2001-15. Various cannon, rocket, and missile alternatives were applied to the scenario.<sup>84</sup>

**Weaknesses.** The single scenario used is programmed for a brigade instead of a MEF campaign. To attempt to correct this shortcoming, linear optimization techniques extended the results to represent three sequential brigade actions.<sup>85</sup> This modeling fails to represent the nonlinear nature of war and the significant increase in multiple, simultaneous targets that may saturate or overload the fire support system in a true MEF campaign. Preparing for this aspect of fire support is critical in developing a balanced combat force.

The model did not vary weather conditions that may affect the availability of air support missions.<sup>86</sup> Instead, every alternative applied a high level of fixed-wing attack aircraft.<sup>87</sup> The only measure of effectiveness for target attacks was enemy kills.<sup>88</sup> This ignores the importance of suppressive and neutralization fires that may force displacement or at least disengagement to allow for friendly maneuver. The psychological impact of indirect fires on the enemy's morale was ignored as well.

The artillery force consisted of battalions with 24 howitzers but the study did not specify if the battalions were organized with a 4x6 or 3x8 structure although the current Marine artillery

---

<sup>84</sup>Marine Corps Combat Development Command, Studies Management Branch, Studies and Analysis Division, *Analysis of Amphibious Assault Fire Support Requirements*, renamed from "Marine Corps General Support Artillery Study," TRADOC Analysis Center-White Sands Missile Range (White Sands Missile Range, NM: October 1995) , iii, 1, 2.

<sup>85</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 2, 74.

<sup>86</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 8.

<sup>87</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 68. During an interview by the author that addressed the merits of the study, a subject matter expert (SME) commented that air availability was overemphasized in the study and unrealistic. The SME was personally involved in the direction and review of portions of the study after the original Marine analyst retired.

battalion structure is 3x6.<sup>89</sup> The timeline for the wargame inserted the artillery one and one-half hours into an amphibious landing and ended three hours later as the close battle began to develop.<sup>90</sup> This tended to ignore the significant contribution artillery makes to the close fight and focuses on the contribution of both air and naval surface fire support in the early stages of an amphibious operation. Despite the cost of computer time (procurement and personnel cost more), the scenario should run for a realistic period to include pursuit and exploitation phases. A more accurate study would analyze several scenarios to create a composite structure recommendation.

**Findings.** The results indicated that air experienced difficulty acquiring the enemy's prepared artillery positions in rugged, mountainous terrain.<sup>91</sup> The entire force suffered more casualties when the counterfire threat was not serviced.<sup>92</sup> Therefore, friendly artillery dominated the counterfire battle. But towed artillery assigned the GS counterfire mission performed poorly due to a decrease in accuracy at greater ranges and poor survivability under fire.<sup>93</sup> The slow displacement times for towed artillery required a tradeoff between survivability moves or maintaining counterfire capability to protect the force.<sup>94</sup> Self-propelled GS artillery experienced a much higher survivability rate due to its armor and mobility and therefore produced better counterfire results that decreased casualties for the entire force.<sup>95</sup> MLRS proved to be a capable

---

<sup>88</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 24.

<sup>89</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 7.

<sup>90</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 17, 32, 76.

<sup>91</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 75.

<sup>92</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 53, 77.

<sup>93</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 64, 77, 78.

<sup>94</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 47, 77, 78.

<sup>95</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 76.

killer that was also highly survivable.<sup>96</sup> The increased range capabilities of rockets help dominate terrain by expanding area coverage by 78% for a range increase of only 33%.<sup>97</sup> HIMARS provided increased flexibility that out-performed towed artillery for kills and survivability and closely approximated the results of MLRS.<sup>98</sup> The study's most significant finding was, "In all cases [basic alternatives] there was insufficient GS artillery firepower to service the mission load," but by increasing the MLRS slice from one to two batteries, overall lethality improved by 26%.<sup>99</sup>

**Conclusions.** The study found the historical 80s force provided the best results, but this included fire from the 16 inch guns of a battleship and the self propelled howitzers.<sup>100</sup> **The study concludes that the "preferred slice of divisional general support assets required to support the brigade in this campaign is two batteries of MLRS,"** but if towed artillery is used for GS approximately two battalions would be required.<sup>101</sup> These are recommended numbers for a brigade battle—not a MEF. The study also highlights the significant contribution that anti-armor munitions like SADARM and BAT offer for future artillery and rocket systems to influence the battle.<sup>102</sup>

This study may have several flaws, but despite the imperfections, the findings and conclusions offer significant insight about future fire support challenges. The combination of

---

<sup>96</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 77.

<sup>97</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 31.

<sup>98</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 77.

<sup>99</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 53, 73.

<sup>100</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 74.

<sup>101</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 74.

<sup>102</sup>*Analysis of Amphibious Assault Fire Support Requirements*, 78.

this study and the “*gut feel*” of field or combat experienced Marines should provide a superior decision making process for the tough structure decisions ahead.

## CHAPTER 6

### ROCKET/MISSILE POTENTIAL

In virtually every article or discussion of future war the enormous potential of rockets and missiles receive laudatory remarks. Daniel Greenberg writes in a *Washington Post* article, “Into the Wild, Blue Yonder—and Out,” that, “For the realists, the weapon of choice is the cruise missile—cheap, fast, accurate and unmanned.”<sup>103</sup> Colonel Wyly comments, “Technology’s relentless march has made deep strike a much less attractive option. Why send manned aircraft when we can produce the same effect with increasingly sophisticated and powerful missiles?”<sup>104</sup>

For longer range systems the arguments revolve around tradeoffs between missiles and various aircraft platforms. But for the close battle the tradeoffs involve air and artillery systems. The growing versatility of rockets or missiles that are launched from the same platform blurs the distinction between the close and deep battle as they provide immense flexibility to the commander to rapidly shift the focus of effort to weight and shape the battle in time and space.

Rockets provide a cheap, unguided carrier that delivers a powerful payload to attack general targets that are dispersed over a large area. Missiles are considerably more expensive due to the on-board guidance and flight systems, but they carry larger payloads with great accuracy to attack high value and high payoff targets with precision that limits collateral damage.

---

<sup>103</sup>Daniel S. Greenberg, “Into the Wild, Blue Yonder-and Out,” *Washington Post*, 4 December 1996, Sec. A25.

---

<sup>104</sup>Wyly, 33.

## Capabilities

The increases in range and lethality of rocket delivered munitions provides for operational flexibility to rapidly attack targets with overwhelming firepower. The psychological impact of a **high volume of massed fires** can shock and deter even the most committed enemy. For example, a rocket battery (nine launchers) can deliver in only 30 seconds the equivalent firepower of a battalion of artillery firing 27 volleys that would take 12 minutes to complete. But to achieve the same surprise and the significantly increased effects of the first volley of fire would require a time-on-target mission comprising 27 separate battalions of artillery (almost double the number of **ALL** Marine Corps artillery battalions in both the active and reserve components) and the time to orchestrate such a mission. In other words, this system does not just replace existing capabilities; it brings a new dimension to the battlefield that provides the flexibility to attack deep and close while simultaneously attacking the mind and spirit of the enemy to decisively break his willpower. Although rockets possess immense capabilities and are touted as the future of fire support, they are not a panacea that will make air or artillery obsolete—at least not in the immediate future.

## Limitations

The current technological state of rocketry poses problems that may limit the flexibility of employment for some fire support missions. The minimum range for the current weapons is 8,000 meters. Additionally, the circular error probable (CEP) is currently 2,000 meters. These limitations combine to prevent employment for close fires normally required for direct support roles. However, all weapons systems have inherent limitations that must be reduced by appropriate doctrine and other mutually supporting systems that in the aggregate yield synergistic support.



Another argument in opposition to rockets is the assumed logistics tail necessary to resupply the unit. The Army's White Paper Report reviewed MLRS support for the Marine Corps. The study approximated a requirement for 2,916 rockets per day for a MLRS battalion to support a MEF on the modern battlefield based on common Training and Doctrine Command (TRADOC) teaching scenarios for a *heavy* threat force. The study, in retrospect, stated that probably half that number may be a more realistic number due to *softer* target sets [or more capable munitions] and more accurate fire systems.

With improved weapons for specific target sets and greater accuracy, expenditure rates should drop dramatically from the average of 6 rockets per mission for this study.<sup>105</sup> This could reduce the ammunition transportation need by more than half and greatly reduce the logistical drawbacks.

But, if that many targets do exist, what will be used to attack them if rockets are not available? These type studies do not appear to apply a combined arms approach nor apply fire support coordination principles to consider the capabilities, limitations, or threat in selecting the means to attack a given target. The same balanced complete system approach should be used in evaluating rockets versus tube artillery or other fire support means. While these limitations do currently exist for rockets, the overall capabilities of fire support are enhanced by the inclusion of rocket artillery to provide an alternative to help diminish the limitations and vulnerabilities of the more traditional systems of air, artillery, and naval surface fire support.

---

<sup>105</sup>Dubia, 7-8. And:

United States Army Training and Doctrine Command, *Operational and Organizational (O&O) Plan for the High Mobility Artillery Rocket System (HIMARS)* (Fort Monroe, VA: 21 December 1990) Document No. AD-B183 877, Defense Technical Information Center (Fort Belvoir, VA: 1994) , Annex A.

## Cost

Some studies imply the costs of rockets are prohibitive. Figure 8 depicts a cost comparison for the equivalent number of comparable artillery rounds to achieve the same number of submunitions (grenades) on target, the MLRS rocket is considerably **less** expensive.

<b>Munition Type</b>	<b>No</b>	<b>Item</b>		<b>Cost (each)</b>		<b>Total Cost</b>
<b>Rocket  155 mm</b>	6	M26 Rocket	@	\$10,400	=	<b>\$62,400.00</b>
	54	BB DPICM	@	\$775.26	=	\$41,864.04
	54	8 S Powder	@	\$783.35	=	\$42,300.90
	54	M577 Fuze	@	\$64.97	=	\$3,508.38
	54	M82 Primer	@	\$1.66	=	\$89.64
						<b>\$87,762.96</b>

**Figure 8. Cost Comparison** (in FY 97 Dollars)<sup>106</sup>

Note 1. The M26 MLRS rocket contains 644 anti-personnel and anti-material grenades. The 155mm Base Burn DPICM projectile contains 72 submunitions. Therefore, one rocket equates to 8.94 BB DPICM projectiles, and 6 rockets equate to 53.67 (or 54) BB DPICM projectiles.

Note 2. The DPICM cost is for the base burn (BB) round that can achieve a range of 28.4 kilometers(km), just short of the rocket range of 30,000 km but far short of the extended range rocket's threshold of 45,000km.

---

<sup>106</sup> James P. O'Donnell, Information Paper, subject: *High Mobility Artillery Rocket System (HIMARS)*, [with updated cost data for 1997], 5 May 1994.

But this may not be a realistic comparison since there is a significant difference in the effect on the target unless all rounds arrive at the same time as expressed in Joint Munitions Effectiveness Manuals (JMEMS). This presents a very challenging mission for tube artillery, but is very simple for rockets.

While many of the costs associated with rocket systems have already been addressed, manpower levels associated with rocket artillery require further discussion. The major challenge facing U.S. Forces in the 21st century is maintaining the balance between the budget and the competing requirements for force structure, readiness, modernization and engagement operations. The fixed costs associated with maintaining a large force structure preclude proper funding for readiness and modernization programs. Technology is touted as a potential answer for maintain capability with fewer people and the current and emerging rocket technology significantly reduces manpower requirements. A MLRS or HIMARS battalion would call for a Table of Organization (TO) of about 436 Marines, but can deliver more firepower than an artillery battalion of over 700 Marines.

The most significant impact of reduced manpower may be realized when deploying in limited shipping or conducting Maritime Prepositioned Force (MPF) operations. With fewer personnel in theater, the logistics support for consumable supplies decreases significantly as a factor of time. Also, skill requirements are reduced, and training can be conducted with computer simulations and inert devices to maintain proficiency. This feature makes rockets particularly well-suited for employment by reserve units or embarked forces who have limited training opportunities. Although Marine artillery has been reduced by 152 tubes since 1988, the loss of capability could be bought back by the acquisition of organic rocket artillery.

## **Technology**

Paul Kaminski, Undersecretary of Defense for Acquisition and Technology, is driving the search for improved munitions that are accurate, all-weather and day or night capable, provide increased range, deliver overwhelming firepower, and are affordable. His approach is to mate high technology with conventional dumb explosives to selectively revolutionize the modernization of munitions.<sup>107</sup> This approach was seconded by Michael Vickers, Director of Strategic Studies at the Center for Strategic Budgetary Assessment as the, “wave of the future.”

**Range.** The significant range improvement of the ATACMs from 165 to 300 kilometers and the MLRS extended range rocket improvement from 30 to 45 kilometers reflect this approach. The improvements show both defense and industry commitment to upgrade current systems to remain at the cutting edge of technology.

**Ammunition.** New approaches to attack selected targets are nearing completion with the introduction of brilliant anti-armor submunitions (BAT) and sense and destroy armor (SADARM) that may revolutionize armored warfare. BAT provides a top-attack munition capable of deploying acoustic and infrared sensing submunitions. Future versions will allow attack of stationery “cold” targets as well.<sup>108</sup> These enhanced systems will provide the commander the capability to attack highly mobile systems without the time delays imposed by the Air Tasking Order (ATO) or the risk associated with hasty manned missions.

---

<sup>107</sup>Pat Cooper, “U.S., Allies Push Improved Munitions for Future Forces,” *Defense News*, 23 September 1996, 1.

<sup>108</sup>Jay Hilliard, MAJ, USA, “ATACMS Block II: Killing Armored Targets Deep,” *Field Artillery Journal* (January-February 1996) : 22.

**Precision.** The range and ammunition varieties for rockets continue to improve with advances in accuracy not far behind. The MLRS smart tactical rocket (MSTAR) couples the MLRS with a smart warhead to enhance precision attack capability at shorter ranges.<sup>109</sup> Precision attack can also significantly enhance the psychological dimension of war previously discussed. Accurate, unseen fires that virtually always find their target should create an unmeasurable demoralizing force. In addition, precision rocket fires will destroy more targets with fewer rounds that will effectively reduce requirements for bulk ammunition support thereby easing the logistic burden associated with ground based systems.<sup>110</sup>

### **Versatility**

Rocket and missile systems' popularity promise to simplify the logistic hurdles of interoperability between the Services. Common rockets for sea and land based systems allow greater production runs that help reduce cost of munitions. Commonality may also reduce the overall size of war reserve stockpiles by minimizing the safety stocks necessary to hedge against a stockout due to the uncertainties of supply and demand. This flexibility may allow theater ammunition stocks to be reduced. Lower stocks also decrease the cost of obsolescence or technological upgrades to existing stockpiles.

### **Mobility**

The short time necessary to deliver devastating firepower allows rocket units to apply "shoot and scoot" tactics required for survivability. Shorter emplacement and displacement times support these tactics by providing more time for movement to stay closed up with the

---

<sup>109</sup> John A. Dubia, MG, USA, "Force XXI and the Field Artillery: State of the Branch 1994," *Field Artillery Journal* (December 1994): 4.

leading maneuver units. This artillery “hip shoot” technique becomes the predominant method of fire support in a highly fluid environment to ensure forces remain well protected under the rocket umbrella. In addition, rockets can be mounted on tracked platforms like MLRS or wheeled variants like the experimental High-Mobility Artillery Rocket System (HIMARS).

The Army is looking to upgrade their light divisions’ fire support systems with a lighter, more mobile platform than the tracked MLRS. To meet that need, the Army is developing the wheeled rocket system called HIMARS. The system mirrors the capabilities of MLRS except it has six instead of 12 rockets per load. Both are capable of firing the same rockets and the ATACM deep strike missile. HIMARS can be delivered by a C130 and can be lifted by a CH53E. HIMARS can provide **expeditionary**, all-weather, long range, maneuverable, and decisive firepower capabilities.

Capt William R. Hittinger, USMC, provides an overview of the system capabilities in the March 97 Marine Corps Gazette article, “High Mobility Artillery Rocket System: General Support Artillery for the Corps.”<sup>111</sup> This appears to be a very promising system and may well be the answer to the Marine Corps requirement for a general support fires capability.

---

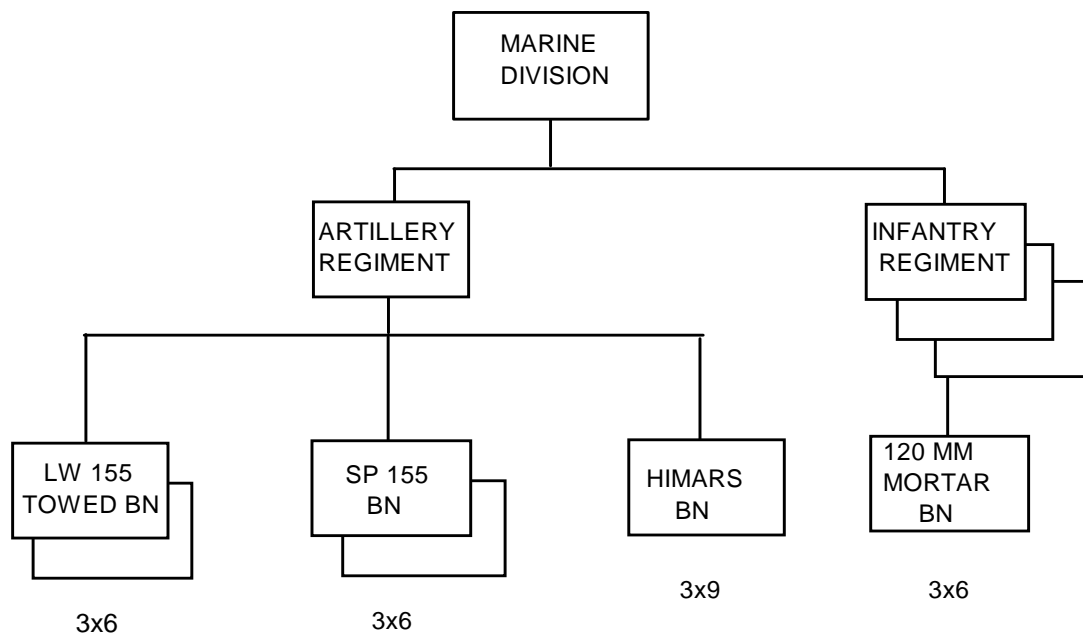
<sup>110</sup>Randall L. Rigby, MG, USA, “Report Out: 1996 Senior Fire Support Conference—Focusing Fires for Force XXI,” *Field Artillery Journal* (May-June 1996) : 21.

<sup>111</sup>William R. Hittinger, Capt, USMC, “High Mobility Artillery Rocket System: General Support Artillery for the Corps,” *Marine Corps Gazette* 81, no. 3 (March 1997) : 34-35.

## CHAPTER 7

### POTENTIAL SOLUTION

Figure 8 presents a notional structure to provide an example of a vision for fire support for the Marine Division in the 21st century. This vision should be indelibly linked with emerging doctrine, equipment procurement plans, and overall force restructuring to ensure effective and timely fire support. This organization will provide the versatility to fight across the full spectrum of conflict by reinforcing and maximizing the mutual support capabilities of the **supported** and **supporting** forces. To create this vision, procurement priorities must be linked with other force enhancement programs to ensure operational feasibility, equipment compatibility, and simultaneous fielding timelines as follows:



**Figure 9. NOTIONAL Marine Division Active Duty Fire Support Structure**

1. The most critical fire support priority for the Marine Corps is the development and fielding of an expeditionary rocket system that will provide general support capabilities to fill the existing void as this paper has attempted to describe.

2. The LW155 howitzer program should continue to develop and field a more mobile, towed and air-deliverable, howitzer to replace the aging M198 weapons. However, the projected quantities required should be reviewed and revised consistent with a modified fire support structure of a diverse mix of systems.

3. A heavy mortar battalion equipped with a 120mm towed mortar system should be organized to provide readily available fire support for OMFTS and urban warfare operations. A battalion structure provides the capability to “mass” fires consistent with maneuver warfare tenants and the principles of war. This modernization plan should be linked with the fielding of the MV22 to support and enhance the flexibility, speed, and range of air-assault operations. Tank and LAR battalions should also receive the 120mm mortar to upgrade their organic fire capability.

4. Self-propelled artillery is necessary to support highly maneuverable mechanized forces if the Marine Corps continues to pursue advanced assault amphibian vehicles (AAAV) and maintain tank and LAR forces. The Crusader howitzer, currently under development, could provide this “system after next” capability. The dispersed tactics employed by advanced self-propelled weapons may yield a secondary opportunity for employment as an “assault gun” to also support maneuver warfare or urban operations with direct fires.

Most importantly, a long term fire support vision is needed to develop a synergistic blend of weapons that: enhances adaptability, increases force combat power, and minimizes limitations through overlapping mutually supporting system capabilities.



## CHAPTER 8

### SUMMARY

Marine Corps fire support should be founded on a balanced force of air, sea, and ground based systems. The current reactionary structuring process, based on weak doctrine and shallow studies, fails to provide a unified and balanced approach to support procurement decisions. The current threat is both internal and external and its vagueness requires a capability approach to force development that has the flexibility to operate across the full spectrum of conflict. The division commander currently does not have, **but should** possess the organic capability to rapidly weight the battle with all-weather, heavy fires. The current MLRS MOA with the Army is not an acceptable long term fire support solution; it only serves as a stop-gap measure that can provide the Marine Corps the time necessary to implement the results of the QDR and design a balanced fire support structure that will blend with the future vision of warfare. Rockets provide an overwhelming increase in firepower with reduced manpower requirements in a cost efficient, rapidly deployable framework. Rocket technology can provide this capability and extend the bridge from current requirements to the futuristic battlefield with the flexibility to remain ready, relevant, and capable.

## CHAPTER 9

### CONCLUSIONS AND RECOMMENDATIONS

Rockets and missiles are undoubtedly the future of fire support and should be an organic asset of the division. Additional support for the MEF should first come from Marine reserve units equipped with rockets also. While the procurement process should continue to evaluate and develop HIMARS, an immediate purchase decision for **any system** is not appropriate at the present time.

As highlighted earlier in this paper, the Marine Corps lacks appropriate doctrine and a true understanding of the proper mix of fire support systems required to support its operational concepts in the future. However, the decisions emerging from the Quadrennial Defense Review (QDR) combined with the results from the DAWMS and CSEEA studies should provide the Marine Corps with ample guidance and sufficient analytical rigor to restructure forces to most effectively employ the doctrine developed in the Warfighting Lab's Hunter Warrior Exercise. Only after the establishment of sound doctrine based on necessary capabilities, and the identification of force structure constraints, should the Marine Corps proceed to procure new weapon systems.

This does not imply that a delay is acceptable--a dangerous void exists now, but recognizes that the limited funds available in the future will only allow one chance to procure the right system. The potential Armed Forces structural changes that may occur as part of the QDR process prevents the decisions necessary to responsibly determine at this time what systems are needed, where to place them, or how many may be needed. Once the QDR and NDP release their reports on service roles and missions, and total force structure, the Marine Corps

must be prepared to immediately act to maintain a balanced force structure and to take advantage of any equipment surpluses that may be available.

Therefore, these decisions can not be deferred for long. The Marine Corps' position on doctrine, required capabilities, and force structure must establish the basis for justifying change. As stated in a staff information paper on MEF Fire Support provided by the Commanding General 1st Marine Division, Major General Admire, as part of a fire support information package offered in response to the author's *Fire Support Questionnaire*:

The Marine Corps must seriously consider getting on board right now [with rocket artillery], particularly if it is truly interested in weighing in toward the procurement of a system with capabilities, platforms, and munitions best suited to support amphibious operations and, more specifically, OMFTS.<sup>112</sup>

Colonel L. D. Walters, Acting Head, Expeditionary Policies Branch of Plans, Policies and Operations, takes issue with the entire concept of a MOA. He sees the requirement for external support as jeopardizing the Marine Corps' concept as an enabling force. In his view, the issue is much larger, "the future of amphibious forcible entry and the mission of the entire Marine Corps may very well be in question. What other capability (for example air) could be traded away for the promises in an MOA?"<sup>113</sup> Only if METT-T warrants, or the two MRC scenario occurs, should additional support be requested as an adjunct of the MOA with the Army. To buy time for the development of a balanced fire support capability and weapons development and procurement, the Marine Corps must renew and strengthen the MOA with the Army. The agreement must cover a minimum of five years and attempt to solve as many of the identified weaknesses as possible. To encourage Army support, the Marine Corps should join in the joint

---

<sup>112</sup> \_\_\_\_\_. Information Paper, subject: "MEF Fire Support," 24 October 1996.

<sup>113</sup> Walters.

development of HIMARS. This will help the Army gain the necessary support for the project and allow the Marine Corps to influence the direction the program takes to further reduce rocket limitations.

The Marine Corps must address its lack of doctrine for structuring fire support. Accepting Army doctrine will save time and resources and enhance joint interoperability in the future. However, that doctrine must be applicable with the Marine Corps force structure and unique missions. The requirement and provision issue for a MEF level artillery headquarters and fires capability should be resolved as part of the doctrinal discussions. Most importantly, the Marine Corps must immediately finalize the *draft* Mission Needs Statement for an Expeditionary Indirect General Support Weapons System (EIGSWS) that emphasizes capability approaches, in place of system approaches, that are required to influence the battlefield throughout the spectrum of general support fires.<sup>114</sup> Without a document that officially recognizes the Marine Corps' concerns on the growing void in general fire support capability, the problem may be ignored by the various QDR panels, and the Marine Corps may, at best, be left with the status quo--or worse, loose even more fire support capability. Once the QDR and NDP findings are released and approved by Congress the Marine Corps must make the difficult decisions to craft a balanced fire support organization that will continue to protect America's freedom in every climb and place.

---

<sup>114</sup>Marine Corps Combat Development Command, Requirements Division, draft letter, subject: "Mission Need Statement for an Expeditionary Indirect General Support Weapons System," undated, released for review in September 1996.

# APPENDIX A: ARTILLERY TACTICAL MISSION INHERENT RESPONSIBILITIES<sup>115</sup>

TACTICAL MISSIONS	INHERENT RESPONSIBILITIES						
ARTY UNIT WITH MISSION OF	ANSWERS CALLS FOR FIRE IN PRIORITY FROM	ESTABLISHES LIAISON WITH	ESTABLISHES COMM WITH	HAS AS ITS ZONE OF FIRE	FURNISHES FORWARD OBSERVERS	IS POSITIONED BY	HAS ITS FIRES PLANNED BY
DIRECT SUPPORT	1. SUPPORTED UNIT. 2. OWN OBSERVERS 3. HIGHER ARTILLERY HEADQUARTERS	SUPPORTED UNIT (DOWN TO BATTALION LEVEL)	SUPPORTED UNIT	ZONE OF SUPPORTED UNIT	TO EACH COMPANY- SIZED MANEUVER ELEMENT OF SUPPORTED UNIT	UNIT COMMANDER AS DEEMED NECESSARY OR ORDERED BY HIGHER ARTILLERY HEADQUARTERS	DEVELOPS OWN FIRE PLAN
REINFORCING	1. REINFORCED UNIT 2. OWN OBSERVERS 3. HIGHER ARTILLERY HEADQUARTERS	REINFORCED UNIT	REINFORCED UNIT	ZONE OF FIRE OF REINFORCED UNIT	UPON REQUEST OF REINFORCED UNIT	REINFORCED UNIT OR ORDERED BY HIGHER ARTILLERY HEADQUARTERS	REINFORCED UNIT
GENERAL SUPPORT	1. HIGHER ARTILLERY HEADQUARTERS	NO INHERENT REQUIREMENT	NO INHERENT REQUIREMENT	ZONE OF SUPPORTED UNIT	NO INHERENT REQUIREMENT	HIGHER ARTILLERY HEADQUARTERS	HIGHER ARTILLERY HEADQUARTERS
GENERAL SUPPORT REINFORCING	1. HIGHER ARTILLERY HEADQUARTERS 2. REINFORCED UNIT 3. OWN OBSERVERS	REINFORCED UNIT	REINFORCED UNIT	ZONE OF SUPPORTED UNIT TO INCLUDE ZONE OF REINFORCED UNIT	UPON REQUEST OF REINFORCED UNIT SUBJECT TO PRIOR APPROVAL OF HIGHER ARTILLERY HEADQUARTERS	HIGHER ARTILLERY HEADQUARTERS OR REINFORCED UNIT SUBJECT TO PRIOR APPROVAL BY HIGHER ARTILLERY HEADQUARTERS	HIGHER ARTILLERY HEADQUARTERS

<sup>115</sup> FMFM 2-7, 2-3.

## APPENDIX B: THE MEMORANDUM OF AGREEMENT

### MEMORANDUM OF AGREEMENT BETWEEN THE UNITED STATES ARMY AND THE UNITED STATES MARINE CORPS

SUBJECT: Memorandum of Agreement between the United States Army and the United States Marine Corps; Army Multiple Launch Rocket System (MLRS) support to the Marine Corps.

1. PURPOSE. To establish a joint agreement to provide Army MLRS augmentation to the Marine Corps artillery when required.

2. REFERENCES.

- a. Joint Publication 3-0, Doctrine for Joint Operations, September, 1993.
- b. FM 100-5, Operations, June 1993.
- c. FM 6-60 w/chg 1, MLRS Operations.
- d. FM 6-121, Field Artillery Target Acquisition, 11 May 1988.
- e. US Army Field Artillery School White Paper, Subject: Army MLRS Support to the Marine Corps, 23 September, 1994.

3. BACKGROUND. The Commandant of the Marine Corps and Chief of Staff of the Army have agreed that MLRS support for the Marine Corps can be provided by the Army.

4. SCOPE. The Army will provide MLRS support based on command guidance, contingency requirements, and units available.

5. UNDERSTANDINGS, AGREEMENTS, AND SUPPORT

a. Doctrine. United States Army doctrine is compatible with Joint doctrine and Marine Corps doctrine. There are no major doctrinal changes required to permit effective integration of an Army MLRS unit in support of Marine Corps Operations.

(1) MLRS units supporting the Marine Corps will normally operate as part of a Joint Force. The Joint Force Commander will determine the command relationship between the Army unit and Marine forces based on Mission, Enemy, Troops, Terrain and weather, and Time available (METT-T). The tenants of chapter III (Command Relationships), Joint Pub 0-2 (Unified Actions Armed Forces) and Joint Pub 3-0 (Doctrine for Joint Operations) apply. The directive establishing the command relationship will address unique logistical requirements and responsibilities for the two services and any other special requirements based on operational needs.

(2) To facilitate planning and execution in the command, control, and logistics processes, the Army and Marine Corps will exchange liaison officers with lateral headquarters in accordance with Joint Publication 3-0.

b. Training. Army MLRS support to the Marine Corps will be integrated into joint and Marine Corps exercises whenever feasible. Commitment to these exercises will be balanced against available resources and scheduled via the Training Employment and Exercise Plan (TEEP) process to allow the Army to identify supporting resources in the Program Objective Memorandum and Five Year Exercise Plan.

Subject: Memorandum of Agreement between the United States Army and the United States Marine Corps; Army MLRS support to the Marine Corps

c. Organization. The Army MLRS unit provided to the Marine Corps may be an active or reserve component Echelon Above Division (EAD) battalion or battery from an EAD battalion. The battalion will be supported by its habitual Corps Support Command (COSCOM) MLRS support team. An MLRS battery will be supported by a proportional share of the MLRS battalion's COSCOM maintenance support. If available and required, Army TPQ-37 Weapons Locating Radars will be provided which will significantly enhance the target acquisition capability of the MAGTF. If provided, the TPQ-37 sections will come with organic maintenance personnel and radar specific repair parts.

d. Logistics. The MLRS unit will normally deploy with its prescribed load list of all classes of supply. Beyond that, the Marine Corps will provide classes of supply I-IV, VI, VIII, and common class V, VII and IX to Army MLRS units. This support also applies to Army MLRS units participating in Marine Corps exercises.

(1). Class V. In the case of MLRS rockets, the Marine Corps responsibilities will be limited to processing requisitions, receipt and positioning Class V to replenish unit mission load that arrives with MLRS unit in theater. The Army will provide MLRS rockets for training and operational commitments within funding limitations. Funding responsibilities for training ammunition between the two services will be reviewed during the biannual MOA revalidation process. Common Class V ammunition required to replenish unit basic load will be provided by the Marine Corps. The MLRS unit will conduct resupply operations forward of the Combat Service Support Element (CSSE) with organic assets (normally not more than 80 kilometers from the CSSE).

(2). Class IX. The Army will develop 30-day Battery and 60-day Battalion contingency packages of Prescribed Load List (PLL)/ Authorized Stockage List (ASL). These packages will match the sustainment requirements of the deploying Marine force. The USMC will provide support in processing requisitions for replenishment and delivery of parts to the CSSE.

(3) USMC will assist the MLRS unit with direct support maintenance common item overflow. The USMC is responsible for retrograde of general support and depot level repairables as appropriate (including missile repairable items).

e. Communications. Tactical telephone connectivity into the Marine Corps system will be provided by the Marine Corps. The Marine Corps will provide Signal Operating Instructions and encryption devices as required for AM and FM radios.

6. This Memorandum Of Agreement will be revalidated biennially.

7. Effective date: Upon last signature.

A. C. BLADES  
Lieutenant General, USMC  
Deputy Chief of Staff for  
Plans, Policy and Operations  
[signed and dated]  
May 26 1995

PAUL E. BLACKWELL  
Lieutenant General, USA  
Deputy Chief of Staff for  
Operations and Plans  
[signed and dated]  
27 APR 1995

## BIBLIOGRAPHY

- Anderson, E. G., III, Col, USA. Director, Directorate of Combat Developments. Memorandum. Subject: "Review of First Draft High Mobility Artillery Rocket System (HIMARS) Operational Requirements Document (ORD)." 11 March 1991.
- Appleman, Roy E. and others. *The War in the Pacific Okinawa: The Last Battle*. Washington, DC: GPO, 1948.
- Army Science Board. Ad Hoc Study, Executive Summary. Subject: "Innovations in Artillery Force Structure." 1996.
- Aspin, Secretary of Defense. Memorandum for Secretaries of the Military Departments.... Subject: "Roles, Missions, and Functions of the Armed Forces of the United States." 15 April 1993.
- Baxter, Leo J., BG, USA. "Field Artillery Vision 2020." *Field Artillery Journal* (December 1994) : 10-14.
- Bennett, Capt, USMC. Marine Corps Research, Development, and Acquisition Command. Report Number 21049-27058, Marine Corps Lessons Learned System. Subject: "Shortage of Direct Support (DS) Batteries." Quantico, VA: 1 November 1990.
- Brown, W. N. Jr., Maj, USMC. *The Reorganization of Marine Artillery*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1992.
- Buckner, David N., Maj, USMC. *A Brief History of the 10th Marines*. History and Museums Division, Headquarters, U. S. Marine Corps. Washington, DC: GPO, 1981.
- Center for Naval Analyses. *Marine Corps Artillery Structure Study (1986-1995): Examples of Scenarios, Targets, and Tactical Dispositions Used in the Effectiveness Analysis*. Arlington, VA: July 1986. Document No. AD-B112 785, Defense Technical Information Center. Fort Belvoir, VA: 1987.
- Cline, Robert A., LTC, USA. "MLRS in USMC Operations." *Field Artillery Journal* (October 1994) : 44-49.
- CMC Force Structure Planning Group. Briefing Slides. Subject: "USMC 2001: A Concept for the Employment of Marine Corps Total Force in Joint Operations into the 21st Century." Quantico, VA: 1993.
- Cohen, Eliot A. "Airpower, the Next War, and the Marine Corps." *Marine Corps Gazette* 79, no. 11 (November 1995) : 38-44.



Conn, Daniel J., Maj, USMC. "USMC Fire Support Conference 1994." *Field Artillery Journal* (August 1994) : 29-31.

Cooper, Pat. "U.S., Allies Push Improved Munitions for Future Forces." *Defense News*, 23 September 1996.

Cosmas, Graham A., and Terrence P. Murray, LtCol, USMC. *U.S. Marines in Vietnam: Vietnamization and Redeployment 1970-1971*. Eds. William R. Melton, Maj, USMC and Jack Shulimson. History and Museums Division, Headquarters, U. S. Marine Corps. Washington, DC: GPO, 1986.

Cureton, Charles H., LtCol, USMCR. *U.S. Marines in the Persian Gulf, 1990-1991: With the 1ST Marine Division in Desert Shield and Desert Storm*. History and Museums Division, Headquarters, U.S. Marine Corps. Washington, DC: GPO, 1993.

Defense Science Board 1996 Summer Study Task Force. Volume 1 Final Report. *Tactics and Technology for 21st Century Military Superiority*. Washington, DC: Office of the Secretary of Defense, October 1996.

Department of Defense. *Chairman of the Joint Chiefs of Staff Report on the Roles, Missions, and Functions of the Armed Forces of the United States*. Washington, DC: Pentagon, 1993.

Department of Defense. *Directions for Defense: Report of the Commission on Roles and Missions of the Armed Forces*. Washington, DC: GPO, 1995.

Desens, M., Capt, USMC, S. Erdelatz, Capt, USMC, A. Hickerson, CPT, USA. *The Marine Corps and Joint Precision Strike: Time to Get on Board*. Monograph. Marine Corps Communication Officers School. Quantico, VA: 1994.

Directorate of Combat Development (DCD) Analysis, Fort Sill, OK. Telephone interview by author, 14 March 1997.

Downey, H. M., III., Maj, USMC. Information Paper. Subject: "HIMARS Capabilities." 16 November 1995.

\_\_\_\_\_. Information Paper. Subject: "Integrating HIMARS into the Combat Development Process." 16 November 1995.

\_\_\_\_\_. Information Paper. Subject: "MLRS Memorandum of Agreement with the Army." 16 November 1995.

\_\_\_\_\_. Information Paper. Subject: "USMC MLRS Requirement." 16 November 1995.

Dubia, John A., MG, USA. Memorandum for TRADOC. Subject: "Army MLRS Support to the Marine Corps." 30 June 1994.

- \_\_\_\_\_. "Force XXI and the Field Artillery: State of the Branch 1994." *Field Artillery Journal* (December 1994) : 1-5.
- Evans, H. W., LtCol, USMC. Headquarters Battery, 10th Marines. Report Number 80706-71683, Marine Corps Lessons Learned System. Subject: "Artillery Regiment Reorganization." Camp Lejeune, NC: 23 March 1991.
- Felton, Carl, Capt, USMC. "Marine Artillery: When Our Best Is Not Good Enough." *Marine Corps Gazette* 78, no. 9 (September 1994) : 61-62.
- \_\_\_\_\_. Fire Support Structure Briefing Slide, XVIII Airborne Corps Fire Support Coordination Center. Subject: "XVIII Airborne Corps." 4 March 1997.
- Fleet Marine Force Manual (FMFM) 2-7. *Fire Support in Marine Air-Ground Task Force Operations*. Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps. 28 September 1991.
- Fleet Marine Force Manual (FMFM) 5-42. *Deep Air Support*. Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps. 4 March 1993.
- Fleet Marine Force Manual (FMFM) 6-9. *Marine Artillery Support*. Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps. 29 June 1993.
- Force Structure Study Group, Concepts, Doctrine, and Studies Activity Development Center, Marine Corps Development and Education Command. Draft. *Marine Corps Force Structure (1980-1989)*. Quantico, VA: August 1980.
- Ford, Joseph M., Maj, USAF. *The American Defense Force*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1994.
- Fulford, C. W., Lt Gen, USMC, CG I MEF. Memorandum to CG Marine Corps Combat Development Command. Subject: "Fire Support Requirements for the MEF." 13 January 1997.
- Fuquea, David C., Maj, USMC. "Men or Missiles for Close Air Support?" *U.S. Naval Institute Proceedings* 122/11/1,125 (November 1996) : 26-29.
- Gangle, R. A., Col, USMC. RLT-5. Report Number 41343-32962, Marine Corps Lessons Learned System. Subject: "Ability of Towed Artillery to Provide Fire Support for the Infantry." Southwest Asia: 4 August 1990.
- Garrett, G. P., Maj, USMC. *The Eagle and the Javelin: Tactical Ballistic Missiles and the Future of U.S. Power Projection*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1992.

- Gombar, Bruce, Col, USMC. Briefing to the General Officer's Symposium. Subject: "21st Century Fire Support." 25 September 1996.
- Goodman, Glenn W., Jr. "Tenacious Tank Killers: Smart Munitions Will Be Ready For The Next Gulf War." *Armed Forces Journal International* (November 1996) : 20-24.
- Gordon, John, IV., LTC, USA. "Deep Attack and CAS--Joint Roles and Missions." *Field Artillery Journal* (November-December 1995) : 6-9.
- Gray, Maj, USMC. 9th Marines. Report Number 02007-88916, Marine Corps Lessons Learned System. Subject: "Employment of Light Armored Infantry (LAI)." Camp Butler, Okinawa, Japan: 4 November 1990.
- Greenberg, Daniel S. "Into the Wild, Blue Yonder-and Out." *Washington Post*, 4 December 1996, Sec. A25.
- Habel, John X., Maj, USMC. "*Risky Business*": *Is the Marine Corps Building or Burning a Bridge for All-Weather Operational Fires and Close Air Support?* Monograph. Marine Corps Command and Staff College. Quantico, VA: 1993.
- Hawes, Christopher A., Capt, USAF and others. *Thoughts on the Force Fires Coordination Center*. Monograph. Marine Corps Communication Officers School. Quantico, VA: 1993.
- Headquarters United States Marine Corps. *Marine Air-Ground Task Force Master Plan 1990-2000*. Washington, DC: 7 July 1989.
- Headquarters United States Marine Corps. *Marine Corps Master Plan 1994-2004*. Washington, DC: 21 July 1993.
- Henderson, David S., MAJ, USA. *An Old Way of Doing Business: The Organization of Heavy Division Direct Support Artillery Battalions*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1993.
- Hilliard, Jay, MAJ, USA. "ATACMS Block II: Killing Armored Targets Deep." *Field Artillery Journal* (January-February 1996) : 22-24.
- Heinl, Robert Debs, Jr., Col, USMC (Ret.). *Victory At High Tide: The Inchon-Seoul Campaign*. Annapolis, MD: The Nautical & Aviation Publishing Company of America, 1979.
- Hittinger, William R., Capt, USMC. "High Mobility Artillery Rocket System: General Support Artillery for the Corps." *Marine Corps Gazette* 81, no. 3 (March 1997) : 34-35.
- Hoffman, W. M., USMC. 11th Marines. Report Number 32131-85706, Marine Corps Lessons Learned System. Subject: "Summary - Post Exercise Report for DESFIREX 2-93." Camp Pendleton, CA: 21 April 1993.

Hollis, Patrecia Slayden. "Joint Fire Support-Training for the Future." Interview with Maj Gen Palm, CG MCAGCC. *Field Artillery Journal* (February 1995) : 6-8.

Hueston, Rick L., CPT, USA. "The Threat—Why Modernize FA Cannons?" *Field Artillery Journal* (May-June 1996.) : 42-45.

Hughes, Edward L., MAJ, USA. "Army MLRS Support for Marines." *Field Artillery Journal* (February 1995) : 20-23.

Isely, Jeter A. and Philip A. Crowl. *The U. S. Marines and Amphibious War*. Princeton, NJ: Princeton University Press, 1951.

Jackson, D. T., Maj, USMC. *Marine Reserve Readiness*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1992.

Lancaster, J. "Military Reshaping Plan is Short of Clinton's Goals." *Washington Post*, 13 February 1993, Sec. A4.

Lopez, Frederick R., B Gen, USMC. 4th Marine Division's position on HIMARS. Subject: "HIMARS." 12 November 1995.

Mahany, Maj, USMC. 11th Marines. Report Number 42658-86881, Marine Corps Lessons Learned System. Subject: "Summary DESFIREX." Camp Pendleton, CA: 7 April 1995.

Marine Corps Combat Development Command, Requirements Division. Draft letter. Subject: "Mission Need Statement for an Expeditionary Indirect General Support Weapons System." Undated, released for review in September 1996.

Marine Corps Combat Development Command, Studies and Analysis Division. Final Report. *Cost and Effectiveness Analysis for the Marine Corps General Support Artillery Study (MCGSAS)*. 18 November 1994.

Marine Corps Combat Development Command, Studies and Analysis Division. Analysis Plan with cover letter and endorsement to Under Secretary of Defense for Policy. Subject: "Marine Corps General Support Artillery Study." 21 December 1993.

Marine Corps Combat Development Command, Studies Management Branch, Studies and Analysis Division. *Analysis of Amphibious Assault Fire Support Requirements*. Renamed from: "Marine Corps General Support Artillery Study." TRADOC Analysis Center-White Sands Missile Range, NM: October 1995.

Marine Corps Development and Education Command. *Marine Corps Artillery Force Structure Analysis*." Quantico, VA: June 1980. Document No. AD-B086 929, Defense Technical Information Center. Fort Belvoir, VA: 1984.

Marine Corps Liaison, Fort Sill, OK. Telephone interview by author, 26 March 1997.

Marine Corps Research, Development, and Acquisition Command, Analysis Support Branch.  
*Cost Benefit Study of Marine Corps General Support Rocket System Alternatives.*  
Washington, DC: 7 June 1991. PSA CN 91071-02-O-7.

Maynard, Andy, Maj, British Royal Marines. Interview by author, 10 March 1997.

Mazzara, Andrew F., Lt Col, USMC. "Artillery in the Desert, 1991: Report #1." *Marine Corps Gazette* 75, no. 4 (April 1991) : 53-55.

Mcarty, J., Capt, USMC. 2d LAI Battalion. Report Number 22729-37700, Marine Corps Lessons Learned System. Subject: "I MEF "Push CAS" Air Support Plan." Southwest Asia: 23 March 1991.

McConnell, G. M. III MEF Force Fires Coordinator letter to AC/S G-3 III MEF. Subject: "I MEF Fire Support for the MEF 1997-2010." 17 December 1996.

McConnell, Kevin M., Maj, USMC. "1996 MAGTF Fire Support Conference." *Field Artillery Journal* 1, no. 4 (September-October 1996) : 28-32.

\_\_\_\_\_. Information Paper. Subject: "MEF Fire Support." 24 October 1996.

Melson, Charles D., Maj, USMC (Ret.), Evelyn A. Englander, and David A. Dawson, Capt, USMC. *U.S. Marines in the Persian Gulf, 1990-1991: Anthology and Annotated Bibliography.* History and Museums Division, Headquarters, U.S. Marine Corps. Washington, DC: GPO, 1992.

Moore, T. C., Maj, USMC. "We Don't Need Jaeger Air." *U.S. Naval Institute Proceedings* 122/9/1,123 (September 1996) : 32-36.

Montgomery, D. J., Maj, USMC. 11th Marines. Report Number 42658-86881, Marine Corps Lessons Learned System. Subject: "Summary - Post Desert Firing Exercise 1-94." Camp Pendleton, CA: 18 September 1993.

Morgan, Clarence Todd, LCDR, USN. *Naval Surface Fire Support: How Can We Get There From Here?* Monograph. Marine Corps Command and Staff College. Quantico, VA: 1993.

Morris, Maj, USMC. Headquarters Battery, 10th Marines. Report Number 31464-58891, Marine Corps Lessons Learned System. Subject: "Concept for Artillery Battalion Structure." Camp Lejeune, NC: 12 March 1991.

Moskin, J. Robert. *The Story of the U.S. Marine Corps.* New York: Paddington Press LTD, 1979.

- Mroczkowski, Dennis P. LtCol, USMCR. *U.S. Marines in the Persian Gulf, 1990-1991: With the 2D Marine Division in Desert Shield and Desert Storm*. History and Museums Division, Headquarters, U.S. Marine Corps. Washington, DC: GPO, 1993.
- Mundy, C. E., Jr., Gen, USMC, CMC. Memorandum for the Chief of Staff of the Army. Subject: "Multiple Launch Rocket Launcher Support For the Marine Corps." 8 December 1993.
- Narney, John and others, PRC, Inc. Final Report to Marine Corps Combat Development Command. *Mission Area Analysis (MAA) of Mission Area 24 - Fire Support (1993-2003)*. Quantico, VA: July 1993.
- Navy Marine Corps (NAVMC) 2907, *Maritime Prepositioning Force (MPF) Prepositioning Objective (PO)*. Washington, DC: Department of the Navy, Headquarters, U. S. Marine Corps. 15 April 1996.
- Naylor, Sean D. "Drills Set to Meet Korean Rocket Threat." *Army Times*, 25 September 1995, 34.
- Nichols, Jr., Chas. S., Maj, USMC, and Henry I. Shaw, Jr. *Okinawa: Victory in the Pacific*. Historical Branch G-3 Division, Headquarters, U. S. Marine Corps. Washington, DC: 1955.
- Nunn, Sam, Senator (Georgia). "The Defense Department Must Thoroughly Overhaul the Services Roles and Missions." Floor Speech, U.S. Senate (2 July 1992) , 102d Congress, *Vital Speeches* 58, no. 20 (1 August 1992) : 621.
- O'Donnell, James P. Information Paper. Subject: "High Mobility Artillery Rocket System (HIMARS)." 5 May 1994.
- Orgeron, Herman J., MAJ, USA. *Multiple Launch Rocket System in Support of the Marine Air Ground Task Force*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1995.
- Palm, L. M., Col, USMC. 10th Marine Regiment. Report Number 32369-40692, Marine Corps Lessons Learned System. Subject: "Summary - 10th Marines Operations." Southwest Asia: 23 March 1991.
- PRC, Inc. Draft Final Report to Marine Corps Combat Development Command. *Operational Maneuver From the Sea (OMFTS) Mission Area Analysis (MAA)*. Quantico, VA: 18 December 1996.
- PRC, Inc. Final Report to Marine Corps Combat Development Command. *Mission Area Analysis (MAA) of Mission Area 24 - Fire Support (1995-2005)*. Quantico, VA: 13 March 1996.

Priddy, John R., Maj USMC. *Adding Thunder to the Lightening[Lightning]-Greater Firepower for the Light Armored Infantry Battalion*. Monograph. School of Advanced Military Studies, United States Army Command and General Staff College. Fort Leavenworth, KS: 26 March 1990. Monograph No. AD-A234 154, Defense Technical Information Center. Fort Belvoir, VA: 1991.

Project Manager's Office, U.S. Army Mortar Systems, Picatinny Arsenal, NJ. Telephone interview by author, 11 March 1997.

Quilter, Charles J., II, Col, USMCR. *U.S. Marines in the Persian Gulf, 1990-1991: With the I Marine Expeditionary Force in Desert Shield and Desert Storm*. History and Museums Division, Headquarters, U.S. Marine Corps. Washington, DC: GPO, 1993.

Rigby, Randall L., BG, USA. "Fires for Division XXI: State of the Branch 1995." *Field Artillery Journal* (November-December 1995): 1-5.

Rigby, Randall L., MG, USA. "Mapping the Future: FA State of the Branch 1996." *Field Artillery Journal* (November-December 1996) : 1-6.

\_\_\_\_\_. "Report Out: 1996 Senior Fire Support Conference—Focusing Fires for Force XXI." *Field Artillery Journal* (May-June 1996) : 18-21.

\_\_\_\_\_. "3x6 Cannon-2x9 MLRS Transition." *Field Artillery Journal* 1, no. 4 (September-October 1996) : 20-23.

Sansone, F. J., Maj, USMC. Point Paper with charts and PM LAV Information Paper attached. Subject: "General Support Rocket System (GSRS)." 8 January 1991.

Shalikashvili, John M., GA, USA. "Joint Vision 2010: Force of the Future." *Defense* 96, no. 4 (July 1996) : 6-21.

Shihata, K., Maj, USMC. *United States Marine Corps Reserve Structure*. Monograph. Command and Staff College. Quantico, VA: 1993.

Shoults, E. E., Maj, USMC. *Let's All Get On Board With CAS*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1993.

Simmons, Maj, USMC. Marine Corps Combat Development Command. Report Number 51249-46842, Marine Corps Lessons Learned System. Subject: "Artillery Force Structure." Quantico, VA: 22 March 1993.

\_\_\_\_\_. Marine Corps Combat Development Command. Report Number 51249-67631, Marine Corps Lessons Learned System. Subject: "MLRS Support for the Marine Corps." Quantico, VA: 22 March 1993.

Smith, Maj, USMC. Headquarters United States Marine Corps. Report Number 51248-81047, Marine Corps Lessons Learned System. Subject: "Employment of 14th Marines." Washington, DC: 22 March 1993.

Smith, Colby B., Maj, USMC. *Case Study: Selected Joint Aspects of the Battle of Okinawa 1945*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1994.

Smith, D. E., Maj, USMC. Memorandum from MLRS Working Group at Pentagon. Subject: "POE-22 Memorandum for the Record." 26 May 1994.

\_\_\_\_\_. Memorandum from MLRS Working Group at Pentagon. Subject: "Memorandum for the Record." 21 June 1994.

Smyth, Col, USMC. Marine Corps Combat Development Command. Report Number 80651-78122, Marine Corps Lessons Learned System. Subject: "Mission Area Analysis 24 (MMA-24): Fire Support Requirements." Quantico, VA: 31 May 1994.

\_\_\_\_\_. Marine Corps Combat Development Command. Report Number 51249-23927, Marine Corps Lessons Learned System. Subject: "Scope of Mission Area 24 (Fire Support)." Quantico, VA: 22 March 1993.

\_\_\_\_\_. Marine Corps Combat Development Command. Report Number 80734-50661, Marine Corps Lessons Learned System. Subject: "USMC Fire Support Requirement." Quantico, VA: 31 May 1994.

Starnes, Capt, USMC. 1st Marine Division G-3 FSCC. Report Number 92330-07280, Marine Corps Lessons Learned System. Subject: "Mission of 75th FA BDE." Camp Pendleton, CA: 10 September 1992.

Steele, O. K. Maj Gen, USMC. CG, 2d Marine Division. Report Number 20448-09836, Marine Corps Lessons Learned System. Subject: "Adequate Artillery to Support Committed Maneuver Elements." Camp Lejeune, NC: 3 November 1988.

Stuart, L. A., Col, USMC. Memorandum to Maj Gen Palm. Subject: "HIMARS." 12 December 1995.

\_\_\_\_\_. Memorandum with briefing slides. Subject: "HIMARS Information." 20 Dec 1994.

\_\_\_\_\_. CO 14th Marines. Point Paper. Subject: "Force Artillery Headquarters Concept." 28 June 1995.

Telfer, Gary L., Maj, USMC, Lane Rogers, LtCol, USMC, and V. Keith Fleming, Jr. *U.S. Marines in Vietnam: Fighting the North Vietnamese, 1967*. History and Museums Division, Headquarters, U.S. Marine Corps. Washington, DC: GPO, 1984.



- Todd, John J., and James M. Holt, LTC, USA. "How Much Field Artillery is Enough?" *Field Artillery Journal* (June 1995) : 20-25.
- Triplett, Mark H., Maj, USMC. *Does the United States Marine Corps Need Multiple Launch Rocket System?* Monograph. Marine Corps Command and Staff College. Quantico, VA: 1994.
- United States Army Training and Doctrine Command. *Operational and Organizational (O&O) Plan for the High Mobility Artillery Rocket System (HIMARS)*. Fort Monroe, VA: 21 December 1990. Document No. AD-B183 877, Defense Technical Information Center. Fort Belvoir, VA: 1994.
- The United States Army and United States Marine Corps. Memorandum of Agreement between the United States Army and the United States Marine Corps. Subject: "Army Multiple Launch Rocket System (MLRS) Support to the Marine Corps." 26 May 1995.
- U.S. President. *A National Security Strategy of Engagement and Enlargement*. Washington, DC: GPO, February 1996.
- Van Riper, P. K., Lt Gen, USMC. CG Marine Corps Combat Development Command letter to Chief of Naval Operations (N86 and 85). Subject: "Naval Surface Fire Support for Operational Maneuver From The Sea." Quantico, VA: 3 Dec 1996.
- Walters, L. D., Col, USMC. Acting Head, Expeditionary Policies Branch. Position Paper. Subject: "General Support Artillery Capability." 24 June 1996.
- Ward, Stephen C., Lt Col, USMC. Memorandum for the Record. Subject: "Trip Report; HIMARS Demonstration, White Sands, 24 APR 91.", VA: 25 April 1991.
- Ware, Howard L., III, MAJ, USA. *Will the "King of Battle" Reign on the Future High Intensity Battlefield?* Monograph. School of Advanced Military Studies, United States Army Command and General Staff College. Fort Leavenworth, KS: 16 December 1988. Monograph No. AD-A210 967, Defense Technical Information Center. Ft Belvoir, VA: 1989.
- Wild, John W., LTC, USA. *The Army of Excellence: How Ready?* Monograph. US Army War College. Carlisle Barracks, PA: 23 March 1987. Monograph No. AD-A182 850, Defense Technical Information Center. Ft Belvoir, VA: 1987.
- Wright, Alexandro M., MAJ, USA. *The Divisional MLRS Separate Battery in Support of the Close Fight*. Monograph. Marine Corps Command and Staff College. Quantico, VA: 1996.
- Wyly, Michael, Col, USMC (Ret.) and Daniel E. Moore, Jr., CDR, USN. "Hunters from the Sea." *U.S. Naval Institute Proceedings* 121/12/1,114 (December 1995) : 31-33.

